The Trade Review and Western Machinist.

FIFTEENTH YEAR.

The only strictly Manufacturing, Industrial and Scientific Paper published in Ohio.

OFFICIAL ORGAN OF THE OHIO INSTITUTE OF MINING ENGINEERS.

PUBLISHED EVERY SATURDAY

Publication Office—Cor. Bond & Superior Streets,

CLEVELAND, OHIO.

Subscription, (Postage included,) $3.00 per Year.

Entered at the Post Office at Cleveland as second-class matter.

ADVERTISING RATES.

One Inch, one time	$1.50
One Inch, three times	3.00
One Inch, one month	5.00
One Inch, three months	10.00
One Inch, six months	17.50
One Inch, one year	30.00

A GRIEVANCE IN THE TIN PLATE TRADE.

Tin plate workers have a grievance. We do not refer to the "lame ducks" of the trade, with whom cheapness is everything and quality nothing, who are ready to work up anything in the shape of tin at a low price, but those who require and must have good plates. For years the former have been crowding down prices; and quality has in consequence suffered to the serious injury and annoyance of those manufacturers whose reputation depends on quality as well as workmanship. What these require is responsible guarantees of quality. Under cover of private brands the most worthless trash is often palmed off on them. There are undoubtedly private brands which are fully trustworthy, but dealers are constantly sending customers bad lots of plate, and though professedly ready to rectify any error in the best way they can, the manufacturer is being constantly left in the lurch. The trade is confessedly demoralized; confidence in the generality of brands is unknown; and the user feels he lives in a region of chance. It is impossible to rely on brands, and the only way the existing difficulty can be properly met is by the introducing of a system of gradings and classifications, letting private brands go for what they are worth. Packages of plates are being constantly sent out by dealers which are utterly wanting in uniformity. The "tares and wheat" are blended. It is for foreign houses of repute to establish a system of accurate gradings. This will never be done without the cooperation of the dealers. What is demanded are letters and numbers for indicating grade; that a systematic inspection should be established, and that dealers should see to it that the lots are uniform. Such a guarantee would give additional value to the plates, so that dealers could not possibly suffer for it. The policy of palming off on customers a medley of qualities, including inferior descriptions to those ordered, even bad and defective plates, has served its time, and it is for manufacturers to insist on such classification and guarantee as the only mode of satisfactory dealing. If they are firm in these matters, jobbers will readily give way, and their representations to foreign exporters will effect a wholesome cure of present grievances. It is time for the honest dealers in tin plate to organize. We are aware that there are those in the trade who ridicule the idea of sampling, but these will be found to be the purchasers of small lots and cheap, indifferent makes. We agree with a correspondent of the *Metal Worker* who observes: "What we are complaining of at present is, that in making bad bargains occasionally, if not habitually, the importers instead of correcting their method of doing business, are now transferring the loss incurred to their customers. Having been deceived themselves, and being bound by the drafts that have been accepted for the shipment, they are in the habit of cheating their customers the same way as they have been cheated themselves." We are far from urging the abolition of brands. We desire a thorough responsibility placed on the importers. This effected, the importers will look out for their own interests, and bring due pressure to bear on manufacturers. Importers would then be led to take precautionary measures against buying so loosely. Let the jobber be posted on the quality of his brands and know what he is buying. He will be saved thenceforth from guessing and be able to fill orders correctly.

TRADE PROSPECTS.

It is admitted on all hands that trade is at once healthy and active. The confident spirit prevailing is the outgrowth of the conviction that business generally is on a solid basis, and singularly free from speculation. Whatever may be said of manufactures, the prosperity of this country is based on the direct products of the soil, and the abundant harvests we have had are to be taken as the guarantee of increased purchasing capacity. Unfortunately for our farmers and unfortunately for our foreign trade, they have refused to make hay while the sun shines, in the way of disposing of their products at current market rates, awaiting to realize prices formerly brought about artificially by the Chicago corner in grain, and hence it happens that foreign countries with insufficient supply who, owing to the high prices held here, sought their supplies elsewhere, have been allowed the opportunity of renewing foreign contracts, so curtailing demands on the United States. In addition, the crops of Northern Europe, all auguries to the contrary, have been singularly prolific. The farmers must accordingly be prepared to meet a falling market, but their profits will be reasonable if not extravagant, and cheapness of breadstuffs will inure to the general benefit of the country. There is such a thing as too strong conservatism, and farmers who only get wise by experience, which, as Dr. Franklin says, keeps a dear school, will know this before a month is over. We notice a large increase of imports and a still larger decrease of exports. Taking the latest published official statistics it appears that the values of the imports of merchandise into the United States during the twelve months ended August 31, 1882, were $741,983,917, and for the corresponding months of the preceding year $643,248,555; an increase of $98,735,362. The values of the exports of domestic and foreign merchandise from the United States during the twelve months ended August 31, 1882, were $737,038,772, and for the twelve months ended August 31, 1881, $894,717,454; a decrease of $157,678,682. Trade cannot but feel the influence of this balance of exports against us, but notwithstanding every department of industry is active. Manufacturers are struggling to get ahead of orders, machine and other works are being enlarged, and there is a prevailing confidence that all well directed enterprise in the productive line will be maintained. The completion of the Delaware, Lackawanna & Western to Buffalo, the vigorous pushing through to the same point of the New York, West Shore & Buffalo road, together with the early completion of the New York, Chicago & St. Louis, which will probably make the western end of the Delaware, Lackawanna & Western, with the consolidation of the Canada road and the running of through trains between New York and Chicago by way of Erie and Grand Trunk, present problems as to the future earnings of trunk lines, subject to so much competition, which our railway contemporaries decline to solve. So vast is the railway monetary interest, so widely distributed are the investments that a falling off in revenue is sure to tell on general trade. We refer of course only to the immediate future. So vast are the resources of this country, so great the energy of its people, that any immediate outlay in the increase of facilities is sure to return a hundred fold in the future.

WELDING IRON AND STEEL.

The only department of iron and steel manufacture in which the older material can be said to have some advantage is in that of plate-rolling. In this industry it is found that the scrap produced in the shearing of a steel plate to bring it to the required dimensions is a very serious source of loss, both on account of the large proportion of scrap and of the fact that this scrap has hitherto been generally treated as only fit for reconversion into ingots, instead of being used as scrap for welding up for other purposes, as is the practice with scrap for iron plates. Recent experience, however, shows that steel scrap may, under suitable conditions, be welded with the same facility as iron scrap. Thus Messrs. Denny, of Dumbarton, made all the forgings for a steamer recently constructed entirely from steel scrap. At the Mersey Steel Works near Liverpool, England, large quantities of steel scrap have been employed successfully for large forgings. Other large users of Bessemer steel have also for a long time been in the habit of utilizing their steel scrap in this way. At Wittkowitz on the continent, where dephosphorized steel is used almost solely for boiler plates and welded locomotive tubes, the whole of the plate shearings are welded into excellent rivet iron, sheets or plates. In fact, the experience of all who have so employed it is that dephosphorized iron is singularly easy to weld; whether this fact is due simply to its purity or to some other cause is at present not ascertained. It is also possible that by rolling very large plates, and subsequently cutting them up, to reduce the shearing scrap to a minimum.

WASTE PRODUCTS.

In the light of modern science past periods may well be regarded as those of extravagance, were it not that the means of utilizing waste had not been brought to light. The latest instance of utilization is that effected at Elk Rapids, Mich., with the gaseous matter given forth by a blast furnace, in which are manufactured 50 tons of charcoal iron per day. Dr. Siemens has pointed out that the products of the gas manufactory are more valuable than the coal itself. So with other manufactures. In the case to which we refer, the vast amount of smoke from the pits, formerly lost in air, is now turned to account by being driven by suction or draught into stills, surrounded with cold water, the result of the condensation being first, acetate of lime; second, alcohol; third, tar; the fourth part produces gas, which is consumed under the boilers. Each cord of wood contains 28,000 cubic feet of smoke; 2,800,000 feet of smoke handled every twenty-four hours, producing 12,000 pounds acetate of lime, 200 gallons of alcohol, 25 pounds of tar. These articles have a commercial value in the manufacturing of various articles. The alcohol has been contracted to a firm in Buffalo, N. Y., for five years, they furnishing the packages and receiving it at the works at 80 cents per gallon. The smoke from 40,000 cords of wood consumed per annum is thus made a source of much profit, as the works are nearly automatic.

THE impediment to the utilization of coal dust, of the value of which we hear so much, is the want of adaptation of open grates, stoves and fire places to its use either separately or combined with other materials which allow of its being consolidated. Railway companies, however, mindful of the economy to be secured, are adapting locomotives to its

use, in the way of testing suggested devices. We may notice in this connection that in the Northwest, the Northern Pacific is testing a new description of fuel. It consists of pulverized lignite, mixed with soluble glass. The process has been in use in Wales since 1873. The material is compressed under a pressure of one ton to the square inch. It is formed into blocks of great density, resisting the action of water. They do not fall to pieces in the fire, or clinker and increase the ash. It is claimed the fuel has a greater evaporative power than an equal weight of coal. The density is greater than that of coal. The cost of preparation is 50 cents per ton. On some Eastern roads companies are now using the fine dust itself, hitherto considered worthless.

THE deliberations of the National Convention of iron and steel manufacturers and iron ore producers held at Cresson last month will undoubtedly exert an important influence on future modifications of the tariff, especially in the direction of removing the ambiguities which allow of the most varied and often erroneous interpretations. Numerous articles in iron and steel will also find specific mention in the coming révision, with assigned duties, instead of being classed as "manufactures not otherwise provided for." The actual changes recommended by the convention were as follows: Iron ore changed from 20 per cent. ad valorem to 85 cents per ton; pig iron increased from $7 to $8 per ton; cast scrap iron increased from $6 to $8 per ton; steel rails reduced from $28 to $22.40 per ton; steel blooms changed from 40 per cent. ad valorem to $20 per ton; steel wire rods increased from 30 per cent. ad valorem to 50 per cent. ad valorem; steel in forms not otherwise provided for changed from 30 per cent. ad valorem to 3 cents per pound.

WE would call attention to our foreign correspondence, which shows the real source of the curtailment in the output of British iron,—a curtailment that has most probably ceased, to have been due to the exorbitant expectations that had been entertained of the extension of our railway systems the present year. Railway building, however, is proceeding with great vigor. In the month of August last 45 miles were added to the Ohio railways on five lines, and the the total length of rail laid down in that month in 32 States amounted to 1,274 miles on 70 lines. The cessation of the western strike places our rolling mills in good position to meet railway requirements. The strike, on the whole, cannot be regarded as having much affected the limitation of railway building as compared with last year. Trade in the early portion of this year was not such as to greatly encourage speculative railway enterprises.

A SELF-BLOWING forge is among the recent mechanical inventions. The hearth and the hood of the forge are of the usual pattern, but underneath the hood is suspended a small steamer. At the top is a safety valve and steam guage, while at the back of the hearth is a water gauage. A return pipe is brought from the boiler to the tuyre, the water in which becomes pretty well heated before again entering the boiler. At the back of the forge is a small, vertical engine, with a two-inch cylinder and a 4½ inch stroke, which, by means of a grooved fly-wheel and endless band, rotates the fan. When lighting the fire the bellows is worked for half an hour by hand, by means of a handle, and during this time sufficient steam will have generated to drive the engine, which will then work automatically as long as required.

A FIRM at Geisslingen, Germany, is said to be using a novel method for copper-plating sheet iron. The sheets are thoroughly cleaned and pickled, and sheet-copper similarly treated is laid on top of them, the edges of the latter being folded over the edges of the former with care, and chalk being plastered under the copper turned over to prevent it from welding. The sheets are then put into a muffle, heated nearly to a white temperature, and passed through rolls three or four times, thus welding them together.

THE sharp demand for money which sets in at this season, operates to check speculation and prevent an upward movement in stocks. The check is all the greater this year owing to the excess of exports over imports, causing shipments of gold to England, and from the circumstance that a large proportion of the sums remitted to the West and Southwest does not as formerly return to the monetary centres, but remains to be invested in legitimate enterprises. Mexico, too, is receiving large sums for her telegraphs and railroads.

JACOB REESE, of Pittsburgh, Pa., puts forth some remarkable claims in regard to an alleged new discovery in metallurgy. He says he is able to melt instantly a bar of cast steel one inch in diameter—which cannot be fused in less than five minutes in the highest furnace heat attainable—simply by throwing against it a column of air having a velocity of 25,000 feet per minute.

MANUFACTURES.

TO MACHINISTS, MANUFACTURERS AND OTHERS.

THE publishers of THE TRADE REVIEW solicit items of information concerning manufacturing and other establishments in any part of the country, and all such items will be promptly inserted in these columns, free of charge. Facts are the only things needed; and all communications should be accompanied with the name of the contributor—not for publication—but as a guarantee of good faith.

Manufacturers, machinist and engineers are particularly requested to communicate any matters of interest relating to their specialties. No one need be deterred from sending any interesting facts in his own language, as all such contributions will be properly revised before sending to press.

OHIO INDUSTRIES.

CLEVELAND.

THE new furnace of the Cleveland Rolling Mill Co., is turning out 150 tons per day.

THE new works of the Excelsior Iron and Brass Co., Cleveland, will soon be completed. The company will manufacture switch and car locks, together with other specialties.

THE Buckeye Stove Co., organized a year ago as the Forest City Co-Operative Stove Co., have just completed an addition to their molding room 51x66½ feet, giving them now room for forty molders.

A CONCERN in this city is making a large machine for sawing sugar hogshead staves for a St. Louis party. The cylinder saw is 36 inches in diameter, and 58 inches long. It is made of steel, and revolves at the rate of 1200 revolutions per minute. The capacity of the machine is from 4,000 to 5,000 staves per day, and saves 30 per cent. of the timber formerly used, and 25 per cent. of the labor.

PETER GERLACH & Co. have made a recent shipment of saws to San Francisco. They have orders for their cylinder sawing machinery from this State, Indiana, Michigan, the Virginias, Kentucky, Tennessee, Alabama, Georgia, Arkansas, Missouri, and Wyoming. In their regular run they are two months behind orders.

THE Midland Rail and Tie Co. has been organized, with headquarters at Lima. The business of the company is track-laying by machinery, using the system of Mr. George F. Harris. The officers of the company are S. H. Sturgeon, President and General Manager; J. C. Holland, Secretary; George Dempster, Vice President; J. M. McKinney, Treasurer.

MOSER & THOMPSON are furnishing 100 tons of corrugated iron roofing and siding for the new rail mill of the Junction Iron Co., at Mingo Junction. This firm is also supplying the crimped iron for the Central Iron and Steel Co.'s new works at Brazil, Ind., and have just completed an order for the Cape Vincent Elevator, at Cape Vincent, New York. They have also engaged to supply the roofing and siding for the new Chase Elevator now being built at Marietta, and are now engaged in putting on a crimped roof on the cast house of the Newburgh Furnace Co., of Cleveland. Lately they shipped a large order of corrugated iron for a new elevator in Galveston, Texas.

The new blowing engine of the Emma Furnace, Newburgh, constructed by the Globe Iron Works, is illustrated in the last issue of the New York *Mechanical Engineer*. Mr. Walter Miller, draughtsman for the company, writes: This blowing engine was designed by Mr. J. F. Parkhurst, of the company. The steam cylinder is 31" bore by 48" stroke; air cylinder is 72" by 48" stroke. The flywheels are 14' diameter, and weigh 7 tons each. The shaft is of the best forged scrap iron and is 10" diameter. The cross-head is of best forged iron with journals 4" diameter 6" long. Rolling valves are used, as will be seen from the drawings. In addition to the main valves, there is a cut-off valve, adjusted to any desired point by a sword-arm driven by an eccentric on the fly-wheel shaft. It is stated that Mr. Parkhurst is the first and only engineer to use a cut-off on a blowing engine, and its continued use is sufficient to demonstrate the practicability of a cut-off on such an engine. The main valves are driven by an eccentric, as usual, on the fly-wheel shaft, working a rock shaft, supported on the bed plate. This arrangement makes a simple and direct motion capable of very high speed with no chance of derangement.

Swank's Directory to the U. S. Iron and Steel Works furnishes the following account of the Cleveland Rolling Mill up to the date of July 25th: Works principally located at Newburgh. Bessemer steel works, built in 1867-8; made first blow October 15, 1868; two 10-gross ton converters; annual capatity, 110,000 net tons Bessemer steel ingots. Siemens-Martin steel works, built in 1876-8; contain five open-hearth furnaces—two 15-gross-ton furnaces and three 7-ton; annual capacity, 40,000 tons of open-hearth steel ingots. Rail mills, built in 1857; 5 heating furnaces, 1 train of rolls, and blooming mill; annual capacity, 90,000 tons of rails. Four rod mills; 4 trains of rolls; annual capacity, 60,000 tons. Wire mills built in 1868; employ 1,500 men; annual output, 27,000 tons of finished wire. Plate mills consist of 6 single puddling furnaces and four trains of rolls (muck mill, 2 sheet mills, and plate mill); galvanizing works attached; annual capacity, 10,000 tons. The company also have a foundry, forge, machine shops, and blast furnaces. Lake Shore Mill, at Cleveland, built in 1852; 4 puddling furnaces; 7 heating furnaces, and 2 trains of rolls; product, iron rails; annual capacity, 30,000 tons. The mill has been repaired with a view to rolling steel rails, with a daily capacity of 135 net tons. The works formerly operated by the Cleveland Iron Company, leased by the Cleveland Rolling Mill Company, consist of 19 single puddling furnaces, 11 heating furnaces, 5 trains of rolls, and 1 hammer; annual capacity, 40,000 tons of iron rails and merchant bar iron. The mill is used for rolling Siemens-Martin steel rails at the rate of 100 tons per day. Product, wire, tire, and spring steel, galvanized and black sheet iron, horse shoes, steel plate, boiler and tank plate, corrugated roofing and siding, Siemens-Martin steel, and Bessemer steel and iron rails. William Chisholm, President; S. H. Chisholm, Vice-President; E. S. Page, Secretary; W. B. Chisholm, General Manager.

THE Excelsior Fertilizer Works are doing a good service in supplying agriculturists with their pure premium ground bone. Farmers generally have been grossly deceived in purchasing what they thought to be bone, and not being chemists they are readily deceived up to the time when indifferent crops disclose the rascality practiced. Their only resource is to go to reliable parties with a reputation at stake, such as this company, which throughout the twelve years of its operations has given a warranty as to purity with every sale.

AT a recent meeting of the Buckeye Glass Co., Martin's Ferry, it was decided to receive more stock to the amount of $22,875, with a view of tearing down the present three furnaces and building two fifteen-pot modern furnaces. Subscriptions to the amount of $49,775 have been taken in, and the indications are that the amount will all be taken soon. This will make 728 shares at $12.50 per share, and is regarded as a good investment.

THE new factory of the Liverpool Glass Manufacturing Co. started up in good shape last week,

and is now running double turn. The well put down for gas was torpedoed at a depth of about 420 feet. It will be tubed and pumped out (the salt water having been struck under the gas rock), and if the gas does not come up to expectations, another hole will be put down.—*Amer. Pottery and Glassware Rep.*

The buildings of the National Machinery Co., of Cleveland, which are going up at Tiffin for the exclusive manufacture of bolt and nut machines, are being rapidly proceeded with, and judging from the architectural designs, the carrying out of which is being supervised by mechanical engineers, will prove models of how works should be constructed for heavy machinery with a view to the avoidance of vibration.

The Stilwell & Bierce Manufacturing Co., Dayton, are supplying Victor turbine water wheels to the fine new paper mills of the Patten Paper Co., at Appleton, Wis.; the Wiley Construction Co., Greenfield, Mass.; Chisholm Bros. & Gunn, Minneapolis, Minn.; Fred Nell, London, England; Richmond City Mill Works, Richmond, Indiana, and Hardesty Bros., Canal Dover, O.

The Ward Iron Company have received four car loads of heavy machinery for their new rolling mill at New Philadelphia, including a large double engine. Work on the new mill is progressing rapidly, and the superintendent thinks they will be ready to kindle fires in October. These works will be the largest in Eastern Ohio.

The Miller Chain Co., Akron, manufacturers of chain, employ 50 hands. Trace and fancy chains which they are turning out merit notice; also their agricultural chains, a prime specialty. They ship all over the Union and were never more busy than at present.

A flour mill is nearly completed at Shelby, on the Odell roller system, the capacity of which will be 400 barrels per day of 24 hours, giving with the Junction Mill, also belonging to Fish, Storer & Co., a capacity for fully 600 barrels per day.

The Victor Stove Co., Salem, which has its works near the railway depot, gives full employment to 45 hands in the manufacture of cooking, parlor and heating stoves. It was established in 1869. The shipments are principally to the West.

The Witman Stove Co., Ironton, lately turned out 196 stoves with 21 moulders, which, together with 2 tons of hollow-ware constituted a good week's work. The company manufacture 45 styles and sizes of stoves.

The Mills Tool Works, Hamilton, employ 300 men, including a night force. They have orders ahead for one year, and foreign orders are constantly arriving.

Experiments with a new gas heating furnace have been made at the mill of the Mahoning Valley Iron Co., Youngstown, and with gratifying success.

The Standard Iron Co., Bridgeport, organized with $200,000 capital, expects to be in running order by Nov. 1st.

The Toledo Cotton Mill Co., Toledo, use 25 bales of cotton every week in the manufacture of twine and rope.

The rolling mill of J. Corns & Son, Massillon, has started up with the full force of 125 men.

Mills at Ironton have started at $5.75 per ton for puddling, or 25 cents ahead of Pittsburgh.

The Smith Foundry Co., New Philadelphia, has been incorporated, with a capital of $60,000.

The buildings of the Youngstown Steel Co., Youngstown, will be ready for use shortly.

The required sum of $5,000 has been subscribed for the new glass works, Canton.

Frank M. Suschart, Xenia, is putting in a Victor turbine.

INDUSTRIES IN GENERAL.

MAINE.

With recent improvements the Dunn Edge Tool Co. and the Hubbard & Blake Co. at Waterville will double their capacity.

Of the $100,000 required to build the projected machine shops in Bath, $90,000 have already been subscribed.

The life and activity which have been displayed in the Bath shipyards during the present season, does not apparently diminish to any great extent, as there are now building within the city limits 18 vessels, whose aggregate tonnage is about 19,000 tons.

MASSACHUSETTS.

The J. R. Torrey Razor Co., Worcester, have lately moved into their new building which is supplied with every convenience and all the modern improvements both in the factory and in the counting room for conducting their business on a large scale. This company is probably the only practical and complete razor manufactory in this country. They make 100 varieties.

The Gosnold Mills, New Bedford, consume 5,000 tons of scrap iron yearly; the product is sold mainly in New England and New York; average force of men employed about 100, and pay roll $5,000 monthly. Iron chains of every description are made from the lightest up to those weighing 20 pounds to the link. All the best chains used in the famous Calumet & Hecla mine are furnished by these mills. Two immense stud link cables of $1\frac{1}{2}$ to $1\frac{7}{8}$ rim are being made for a merchant bark, with auxiliary steam power, to run between Boston and San Francisco.—*Boston Com Bulletin.*

NEW HAMPSHIRE.

A factory for evaporating fruit has been started up at Weare, by Mr. Edward Jones of that place. He will employ 30 hands, using 150 or more bushels of apples daily.

CONNECTICUT.

A stock company is forming at New Haven to make artificial stone and marble under a new patent. This stone is largely used for building purposes, and while 50 per cent. cheaper than nature's stone, is said to be just as durable.

The buildings of the Corbin Cabinet Lock, Judd Iron Co., Vulcan Iron Works and the large addition to Russel & Erwin's screen factory at New Britain, are rapidly nearing completion.

The Meriden Britannia Co., and other britannia companies in that city have begun to work nights on account of the rush of fall trade.

Wallingford has raised the necessary $100,000 to induce the Wilson Sewing Machine Co., of Chicago, to locate there. The capital of the company is to be $300,000.

NEW YORK.

Our New York correspondent writes: Mr. R. Dudgeon, manufacturer and patentee of the hydraulic jacks, punches, roller tube expanders, steam hammers and rotary engines, 24 Columbia street, established 30 years, employs 60 hands. Shipments are made all over the Union, and he has a large export trade. He has a branch house in London, England.

The New York Plow Co. have started all their machinery in their new works at Yonkers. They employ 200 hands and have large orders for foreign trade in plows and corn shellers.

NEW JERSEY.

The Chester Furnace of W. J. Taylor & Co., at Chester, is now making about 250 tons of superior mill iron per week, mostly from the ores of Chester and Hacklebarney, which contain much sulphur. This result is no doubt due to the superior manner in which the ore is roasted and desulphurized in the Taylor gas kiln, which is roasting regularly about 280 tons per week of hard blue ore, containing from $2\frac{1}{2}$ to 3 per cent. of sulphur, which is practically eliminated.

PENNSYLVANIA.

From Bradford our correspondent writes: Messrs. Bovaird & Seyfang, of the Central Iron Works, cor. Davis and Boylston streets, manufacturers of drilling and fishing tools, and machinists' and founders' work, employ 50 hands. Trade is reported very good. Together with orders from the East, large orders are at present on the books of the firm for tubes to be shipped to California.

Our Corry correspondent writes: The Gibbs & Sterrett Manufacturing Co., manufacturers of "Climax" mowers and reapers, engines and boilers, mill machinery, &c., employ on an average 250 hands in the busy season, which is in the spring of the year. In about three weeks they will put on a full force of hands.——The Cuba House has been run by Maj. W. H. Withey, the proprietor, for two years. The establishment has been newly furnished throughout, and there is a spacious sample room on first floor. The hotel is well patronized, and is the best in the town.

The new blooming mill of the Pittsburgh Steel Casting Co., is nearly finished; it is 102x200 ft., of iron.

James Rees & Sons, of the Duquesne Boiler and Engine Works, Pittsburgh, have completed one of the largest fire-box boilers ever built there. It weighs about fourteen tons and was shipped to South America by the way of New York, where it will be placed on a steamboat.

The old locomotive works at Connellsville are to be transformed into a sewing machine manufactory.

New rubber works are to be erected at Williamsport, at an expense of $100,000.

ILLINOIS.

The American Roofing Co., Chicago, has recently been incorporated with a capital of $100,00.

The new and extensive glass works at Belleville, give employment to 200 hands.

The Marseilles Paper Co. are erecting very extensive and complete paper mills.

INDIANA.

The Ohio Falls Iron Works, of New Albany, have just completed a new guide mill heating furnace. They are running full, double turn, with an output of from 40 to 50 tons of finished iron per day.

KENTUCKY.

The Ashland Iron Works, Ashland, are using a good deal of Alabnma ore, which is carried by the Cincinnati Southern to Cincinnati and thence in barges up the Ohio.

TENNESSEE.

McMinnville is to have a wagon and carriage wheel factory. The enterprise is already under way, and is in the hands of some of the most enterprising and solid men of the place.

CORRESPONDENCE.

From our special correspondent.

Titusville, Pa.

One of the largest establishments at Titusville, is that of the Gibbs & Sterrett Manufacturing Co., manufacturers of steam engines and boilers, iron tanks and stills, drilling tools, and supplies for oil and artesian wells, who have also branch works at Corry. They employ on an average 500 hands. The business done is about the same as this time last year. This trade is very much in the west. The company do a large business in their celebrated Climax mower and reaper, and both with the west and southern States in engines. Their oil well supplies are distributed throughout the oil regions.——The Steam Engine Manufacturing Co., Foster & McKay, manufacturers of portable and stationary steam engines and boilers, circular saw mills and general machinery, have 97 skilled artisans in their employ, and have orders way ahead to the amount of $50,000. Their portable engines from 8 to 40 h.p., are of the best and most approved styles, built in the most perfect manner and adapted for all kinds of work requiring power; mounted on wheels for agricultural use, or on skids, combined or detached, for saw mills and factories, they give the best satisfaction.——Messrs. Ames & Keese, whose specialties, in addition to boilers of all kinds, are drilling tools, supplies for oil or artesian wells, steam pumps, stills, tanks and tank cars, and fittings for pipe lines, employ 75 hands. They have had a good trade up to the present time.——Mr. Edgar Hale, manufacturer and dealer in pine, oak and hemlock lumber, Pine street, A.V. railroad, has been established 17 years and employs 30 hands. Trade just now is a little slack, and through the season has not been so good as last year.

Mica.—One of the chief uses of mica at the present time is for stove doors and lanterns, the fire-resisting qualities of the mineral, together with its transparency, rendering it specially adapted for the purpose. But only the very clearest and best sheets of mica can be thus used. Vast beds of the substance exist in various parts of the country, for which, except the finest portions, as above mentioned, there is little demand. New uses will, however, doubtless be discovered and invented, for mica is made up of valuable materials. We notice among the recently granted patents two inventions in this line. One is for the manufacture of journal boxes of cement, ground mica, and flour; the ingredients are mixed, pressed into shape, and then baked. The other is an apparatus for reducing mica to an impalpable powder and preparing it for use as a mixer in starch gloss and oily compositions.

FOREIGN CORRESPONDENCE.

ENGLAND.

WOLVERHAMPTON, September 23.

The iron trade of the United Kingdom is in an anomalous condition at present, and much attention is, therefore, being directed to this enormous industry. The year opened with a strong buoyant feeling full of hope and expectation of a general expansion of our home and foreign iron industries, great stress being laid on the certainty of another "boom" from America. As a consequence of that feeling consumers and merchants bought all kinds of iron freely and in large quantities in the anticipation of the good time coming. Scotch pig warrants in the beginning of January were quoted 53s., Bessemer iron 65s., and Cleveland pig 43; today the respective prices are 47s. 6d.; Scotch 52s. 6d. Bessemer, and 43s. Cleveland. It may be interesting to endeavor to explain the cause of the fall in values of Scotch and Bessemer iron. The roseate anticipations at the commencement of this year have not been realized; the American demand which has been a mainstay for the past two years has in a large measure collapsed. The projected railway extensions of which so much was heard a few months ago are never mentioned now. In 1881 America built 9,000 miles of new railway, but it is now doubtful whether even 7,000 miles will be laid down this year instead of about 18,000 as was anticipated at the beginning of 1882. Judging from her statistics the United States means to supply her own wants to a very large extent. Her productive power has been developed to an enormous extent lately, and now her output reaches a total of five million tons of pig iron per annum against two millions and a half in 1878; doubled, in fact, in four years. The prevalent belief is that she will take smaller quantities of Scotch and Bessemer pig iron and blooms than she is now doing, for the exportation of iron and steel rails is entirely out of the question, the figure, in fact, being about 30s. per ton against us. Practically, America has taken no Cleveland pig iron this year, notwithstanding the sanguine expectations of six months ago. The present depression in iron and steel is undoubtedly traceable to the disappointment in the American demand, and as Scotch and Bessemer iron have been dependent upon that market we now see the relapse in values of both. Since the beginning of this year stocks of iron in Scotland have increased by about 25,000 tons. Stocks of Bessemer iron have also increased considerably, but accurate figures cannot at present be obtained. As a further indication of the demand having to a large extent been overtaken by supply, it may be stated that steel rails have been lately selling freely at £6 5s. per ton cheaper than the highest point touched this year. The unprecedented demand for steam shipping alone remains as the prop of the great iron industries of the North of England. Her iron rail trade is a blank, but in its stead Cleveland has developed the making of shipbuilding materials such as plates and angles to such an extent that it now equals the production of rails and ther classes of iron combined in brisker times. For the past six months Cleveland iron has maintained a strong position in consequence chiefly of the restriction in the make of pigs and the briskness of shipbuilding. But an artificial tone has been given to the market by makers of both pig iron and manufactured iron combining to maintain prices. Moreover, it is no secret that certain iron masters are supporting the market by buying up warrants and scrips in order to force consumers and merchants to pay the combination prices. This novel action is similar to the farmer buying his own crop. The prices of Cleveland iron, both pig and manufactured, are relatively much higher than any other market in the country, and as Cleveland is loosing many markets in consequence it remains to be seen whether she can live commercially without them. Her stocks have certainly been greatly reduced, but this has been attained mainly by the restriction in the make to which I have already referred.

A LOCOMOTIVE boiler, it is calculated, will last until the engine has traveled over 350,000 miles. On some lines, however, the boilers, under favorable circumstances, particularly when pure water is used, may travel 400,000 or 500,000 miles before becoming unserviceable. It is estimated that in this period the fire box will probably require to be renewed at least three times, tires of the wheels five or perhaps six times, the crank axles three or four times, and the tubes from seven to ten times.

TIN PLATES.—What is commonly called "tin" is more correctly designated by the term "tin plate." The term "tin" indicates simply the metal—what is commonly known in the trade as pig tin or bar tin, while "tin plate" indicates plates—most generally of iron—coated with the metal tin. When these plates are finished they are packed in boxes or cases, and are then known as boxes of tin—or, accurately speaking, boxes of tin plate. The actual quantity of tin employed in coating tin plate is very small when comparing it with the body of the plate, yet it is not so small that it cannot be lessened by certain processes of manufacture—to the material detriment of the finished article; nor is it so small but that a profit may be made by dishonest manufacturers by adulterating it. These general statements show some of the directions in which we must search for the actual merits or demerits of the tin plates which we use. Of the tin plates of commerce there are two general kinds: One is known as "tin plate" or "bright plate" and the other as "terne plate" or "roofing plate." The coating of the former is supposed to be pure tin, and the bright appearance which it presents gives it the name by which it is most commonly designated, "bright plate." The coating of the second kind is composed chiefly of lead, which, being dull, or dead, in appearance, gives it the name usually applied to it, "terne," that term being a French word signifying "dull appearance." In considering tin plate for any purpose whatever, it is necessary to examine both the plate and the coating with which it is covered. There are several important particulars to be taken into account with respect to each of these items in making a selection for any purpose.—*N. Y. Metal Worker.*

NICKEL PLATING BY ELECTRICITY.—An improvement has been obtained in the deposition of metals by electricity through the application of the dynamo-electric machine to nickel plating. The electricity thus produced by motive power secures perfection for the nickel plating, both as to smoothness and regular character of the deposit. Not only is the current produced at a far less cost but it can be regulated or controlled, so that the smallest article can be separately coated by a dynamo-electric machine, capable (in its full application) of depositing from twenty-five to thirty pounds of silver per hour. It is a remarkable fact, moreover, that metals can be deposited from their solutions by dynamo-electricity in less than one-third of the time occupied by the ordinary battery in producing the same result. A fine, clear deposit (or "shell") of copper, 800 square feet, can be obtained by a dynamo machine in less than three hours without "pin-holes" and other defects common to battery-deposits. It will be at once seen that the ordinary battery is effectually and unmistakably superseded. Dynamo-electricity can be applied to the production of chemically pure nickel solutions and salts of nickel, for the electro-deposition of the metal. The vast amount of electricity generated in a dynamo-machine enables one to dissolve nickel and other metals in their own solvents, far more economically, and in greater purity than by the ordinary method of treating metals. Electrical power obtained by the ordinary galvanic battery would be far too expensive for this purpose.

ADHESION OF BELTS.—The kind of adhesive used has much to do with the driving power of belts. Suppose fine lubricating oil be employed on clean surfaces of belt and pulley; this will effectually exclude the air from the surface of contact, but the driving power will be reduced to a minimum, if there be any at all transmitted. If dry dust of yielding material be employed on clean surfaces of belt and pulley, then, indeed, will the air with the dust diminish driving power. There are conditions of belt driving where it is alleged the interposed film of air *lessens* adhesion. Upon this, Rankin says: "It is well known through practical experience that a belt for communicating motion between two pulleys requires a greater tension to prevent it from slipping when it runs at a high than at a low speed. Various suppositions have been made to account for this, such as that of the adhesion to the belt of a layer of air, which at a very high speed, has not time to escape from between the belt and the pulley. But the real cause is simply the centrifugal force of the belt, which acts against its tension, and therefore slackens its grip on the pulleys.

TRAFFIC in lumber is on the increase.

RAILROADS.

THE earnings of the Baltimore & Ohio Railway Co., for August were $1,751,831, the largest revenue earned in any month in the history of the company.

THE trffiac earnings of the Lake Shore for the first seven months of 1882 were $9,338,930, as compared with $10,343,453 for the same period in 1881; a decrease of $1,004,523.

Youngstown & Chicago railroad will run from Youngstown to a point west of Niles on the P. & Y., thereby saving the expense of buying right of way and grading for a distance of about 12 miles.

WHEN the Wheeling & Lake Erie is consolidated with the Cleveland & Marietta, as will be done within a short time, the entire system will consist of 400 miles of road.

THE grading of the Atlantic & Pacific Railroad is now completed to within 58 miles and the track laid to within 175 miles of the Colorado river.

SINCE the opening of the Cincinnatti Exposition the Marietta railroad has not been able to properly accommodate its passenger travel. All its cars on all its trains go crowded.

THE first through shipment by rail from New Orleans to California, by the New Orleans Pacific Rrilroad, was made on the 20th ult., and consisted of 31 bales of cotton piece goods to San Francisco.

THE Youngstown & Austintown Railway Co., branch line, was incorporated Monday at Columbus. This is the line to run from the Leadville Shaft south through the coal fields near Cornersburg, and will probably be continued to Canfield connecting with the Niles & New Lisbon Railroad.

THE building of the new bridge over the St. Lawrence above Montreal, at Lachine, which is now projected, will open a new era in the railroad intercourse of Canada and the States.

PARIS is going to have an extensive system of undergronnd railway, the central station being at the Place de la Bourse and the lines radiating into every quarter and completely surrounding the city with an extension to the suburbs as far as St. Cloud.

TRACK of the New York, Chicago & St. Louis has now been entirely completed on this road by laying the following gaps: from Derby, N. Y., to junction of New York, Lake Erie & Western at Buffalo, 16.60 miles; from Cleveland & Pittsburgh crossing to Lake Shore & Michigan Southern crossing Cleveland, 7.24 miles; near Grand Crossing, Ill., to connection with Illinois Central, 1 mile; total additional track, 24.84 miles. This added to the 486.96 previously reported makes the total track 511.80 miles. The length of the line from Buffalo to Chicago, including the track of other companies used, is 523.30 miles.

CURIOUS FACT CONCERNING BOILING WATER.—At a recent Association meeting, Mr. A. J. Haddock, A. I. C., related the following: A kettle filled with boiling water was hung in the hottest room of some Turkish baths with the lid on. The temperature of the surrounding air was 262 deg. Fahr. After about an hour the temperature of the water was taken, and indicated, as was expected, 212deg. The kettle was then rehung with the lid off. The temperature of the room was now 252 deg. In twenty minutes the temperature of the water had fallen to 185deg., in thirty minutes to 178deg., in forty-five minutes to 170 deg., and was evidently still falling. The manager stated that it generally fell finally to about 145 deg., when a point of equilibrium seemed to be established, and the water neither got hotter nor cooler. Mr. Haddock supposes this loss of heat was due to rapid vaporization and conversion of the sensible heat of the water into the latent heat of steam, and as dry air is a very bad conductor of heat (one of the worst known), the heat required to convert a portion of the water into steam had to be abstracted from the remainder of the water, thus lowering its temperature. In substantiation of this explanation we know as a fact that if water is placed in a vessel over a large bulk of strong sulphuric acid, in the receiver of an air pump, and the air is exhausted, the rapid evaporation of one portion of the water will actually cause the rest to freeze.

A TRAIN carrying nothing but peaches comes over the Pennsylvania road every night.

ITEMS OF INTEREST.

Cowley county, Kan., has a fire clay from which bricks as white as milk are manufactured.

Thirty thousand barrels of apples were shipped from New York to London in one day recently.

Germany is interested in the construction of a canal connecting the North Sea with the Baltic.

There is a real estate boom in the city of Mexico, where it is said there are 3,000 houses in course of erection.

Careful estimates put the daily production of petroleum for the oil region as follows: Allegheny field, 15,000 barrels; Bradford field, 45,000 barrels; Cherry Grove field, 7,500 barrels. In all these fields the production is declining, and Cherry Grove is rapidly going dry. A few weeks ago it was estimated at 35,000 barrels a day.

Hollow steel shafting is being introduced into France. It is made by casting the metal around a core of lime, the ingot being finally rolled into shafting, the lime core going with it, and diminishing in diameter in the same proportion as the metal, even when the total diameter is reduced as low as one-fourth of an inch.

In 1881 our export of domestic merchandise to Mexico was upwards of $9,000,000, against only $6,000,000 for the previous year; and the increase for the present year will be greater still. In some lines of goods our manufacturers are not only supplying the natural increase in demand, but actually winning to themselves trade formerly held to a great extent by the English, French and Germans.

According to our German exchanges, a Leipsic (Germany) firm has proposed a novel method of cleaning chimneys. It consists in forcing into the chimney a large quantity of air, by means of a small engine, and the soot, it is claimed, is speedily removed by the friction of the air in passsing through the interior. A suitable trap placed at the top of the chimney serves the purpose of preventing the discharge of the material into the air.

The New York *World* publishes 10 columns showing the building of the Brooklyn bridge has been in the hands of a ring since the commencement of operations. It claims that the books and accounts of the bridge company are full of forgeries, misrepresentations, errors, and that the original estimate of $7,000,000 for the erection of the bridge has been swollen to $22,000,000; that only one-fifth of the bridge expenditure has been accounted for.

The *Engineering and Mining Journal* says that the struggle for the patent on the basic process has not reached an end, and is complicated by the appearance of another claimant. The Patent Office decided some time ago in favor of Mr. Jacob Reese, and against Thomas, Harmet, and others, on certain points, but as yet no patent has been issued to him. It is now announced that an interference will be declared between Mr. James Henderson, a well-known inventor, and Mr. Reese, on the broad claim by the former of dephosphorization after decarbonization.

As an instance of the enormous speeds which are attained in hoisting in English collieries, the following will be read with interest. At the Bestwood colliery, near Nottingham, a pair of direct-acting hoisting-engines, with cylinders 36 inches in diameter and 6-foot stroke, are employed in raising coal from a depth of 1,300 feet. One complete run, including charging, is made in 55 seconds, the weight of coal raised being 2 tons 2 cwts. Therefore this engine is capable of hoisting 150 tons in 8½ hours from the depth of 1,300 feet. The average speed of the cages while running is 22 miles per hour, and the maximum about 35 miles per hour.

A firm of engineers in Berlin have adopted a novel method of ascertaining the water-level in boilers in the dark. The ordinary water-gauge is fitted with a luminous float and luminous marks. The float consists of a glass tube with shot at the lower part to keep it upright. At the top is the luminous mixture, a compound of Balmain's luminous paint and phosphate of soda, a combination which becomes phosphorescent at a temperature over 80 degrees, without previous exposure to light.

The art of shorthand is, it appears, to be superseded by one of the queerest inventions on record. The revolution is to be effected by means of a machine called a "glossograph," consisting of six levers, forming a sort of cage, each communicating with a tracing pencil. The use to be made of the "glossograph" is rather curious. While the orator or lecturer is holding forth, the reporter is to repeat the words of the speaker with his tongue in the cage. Thus the quickest conversation, some London journals tell us, may be taken down with ease. The ludicrous aspect which this new invention assumes may be an obstacle to its adoption.

MECHANICAL RECEIPTS AND ITEMS.

To Prevent Screws from Slipping.—We are always glad of useful mechanical suggestions. Our able contemporary, the *English Mechanic*, adverting to the persistent slipping of screw drivers observes: "All that is wanted is a short tube, big enough to enclose the screw-head somewhat tightly, but only spring tight, so it may rise as the screw head comes near the wood; also, to provide for heads of different sizes with the same driver. All this can be done by just turning up a strongish tin tube three or four inches long, like a slate-pencil case, big enough to slide over the widened point of a round screw-driver, and then fitting spring-tight on the shank by means of a piece of leather wrapped around it; and for larger screws than usual, take the socket off and put a larger one on, with a thicker piece of leather."

Soldering Cast Iron.—Soldering cast iron, says the *Engineer*, is generally considered to be very difficult, but it seems to be only a question of thoroughly making bright the surface to be soldered and using good solder and a clean swab with muriatic acid. Sodium amalgam might be usefully employed for the purpose.

To Recut Files and Rasps.—To recut by a chemical process, dissolve four ounces of salaratus to one quart of water, sufficient to cover the files, and boil them in it for half an hour; then take out, wash and dry them; then stand them in a jar, fill it up with rain water and sulphuric acid in the proportion of one quart water and four ounces acid.

To Brighten Iron.—A good way of brightening iron articles, such as plates or wires, is to place them, when taken from the forge, in a dilute sulphuric acid, wash them in clean water and dry them in sawdust. Afterward they should be dipped for a second in nitrous acid, and washed and cleaned again. It is said that iron goods thus treated have a bright surface and a white glaze without undergoing any of the usual polishing operations. This is a process that those interested can easily test for themselves. Boden, who discovered this method, says that the action of sulphuric acid is increased by the addition of a little carbolic acid, but it is difficult to see what effect this can have, and it may be very well dispensed with.

To Enamel Cast Iron Pipes.—One enamel for water pipes is as follows: 28 parts by weight of silica, 11 of calcined carbonate of soda, and 6 of carbonate of lime. Another is 34 parts of silica, 11 parts calcined carbonate of soda, 12 of chalk, and 11 of dried pipe clay, to which boracic acid or oxide of lead can be added when a more vitrious enamel is required. The core forming the inner surface of the pipe, and if desirable, the mold also, is coated with black lead and the enamel as a powder or paste is applied to the thickness required. The molten iron causes the enamel to soften and firmly adhere to the iron. If it is not necessary that the enamel should be smooth the black lead may be omitted.

Management of Engines.—Blow through the test tap at the bottom of the guage hourly, as well as through the tap in the bottom neck, and the tap in the top neck twice daily. These taps should be blown through more frequently when the water is sedimentary, and whenever the movement of the water in the glass is at all sluggish. Should either of the thoroughfares become choaked, clean them out with a wire. Work the floats up and down by hand three or four times a day to see that they are quite free. Always test the glass water guages and the floats thoroughly the first thing in the morning before firing up. It does not follow that there is plenty of water in the boilers because there is plenty of water in the guage glass. The passages may be choked. Also empty gauge glasses are sometimes mistaken for full ones, and explosions have resulted therefrom. Hence the importance of blowing the test taps frequently.

USEFUL RECEIPTS.

Stopping Leaks in Rubber Rings.—A solution of pulverized gum-shellac in ten parts, by weight, of strong ammonia, is useful in stopping leaks where rubber rings and plates make connections between steam and other plates. It is well to let the ammonia act on the shellac for several weeks before using it.

Fluid for Tracing on Cloth.—Ox-gall filtered through a filter-paper arranged over a funnel, boiled and strained through fine linen which arrests the scum and other impurities. It is then placed again on the fire, and powdered chalk is added. When the effervescence ceases the mixture is again filtered, affording a bright colorless liquid. When the cloth tracings have to be heliographed raw sienna is also added to the ink, as this unites with it most intimately, besides intercepting the light.

To Make a Waterproof Varnish.—To make a waterproof varnish for brass models, something that will dry quickly, try the following: Shellac, 3 ounces; alcohol, 1 pint; dissolve by digestion and agitation in a covered vessel, and dilute with alcohol if not thin enough for use. Warm the metal and apply the varnish quickly.

Cement for Small Iron Articles.—Take two parts sulphur, and one part, by weight, of fine black lead; put the sulphur in an old iron pan, holding it over the fire until it begins to melt, then add the lead; stir well until all is melted; then pour out on an iron plate, or smooth stone. When cool, break into small pieces. A sufficient quantity of this compound being placed upon the crack of the iron pot to be mended, can be soldered by a hot iron in the same way a tin-smith solders his sheets. If there is a small hole in the pot drive a copper rivet in it and then solder it with this cement.

Coloring and Pickling Gold Alloys.—Gold alloys, particularly those that contain copper, acquire, through repeated heatings that take place during their manufacture, an unseemly brown or brownish-black color, caused by the oxide of copper. To remove this they are boiled or pickled in very dilute sulphuric or hydrochloric acids, according to the color that they are to have. If we have an alloy containing only gold and copper, either sulphuric or hydrochloric acid is employed, for gold is not attacked by either of them, while the oxide of copper dissolves so easily that after the pickling the articles have the color of pure gold, for the surface is covered with a thin film of gold. If the alloy consists solely of gold and silver, the liquid employed is nitric acid, and the articles are left in it only a short time; the acid dissolves a very small quantity of silver, and hence the articles acquire the color of gold. If the alloy contains both copper and silver, besides the gold, the method of pickling can be varied to suit the color that it is desired to give to it. If, for instance, it is put in sulphuric acid, the copper alone is dissolved, and the color obtained is that of an alloy of gold and silver, for the surface consists of these two.

To Preserve Wood.—A new wood-preserving process has been invented in France by M. Jacques. He first impregnates the timber thoroughly with a simple solution of soap mixed with an acid. This causes the formation, in a few days, within the wood, of a fatty acid, which is insoluble in water, and impregnates the remotest fibres. The reaction of the acid on the soap does not take place until a portion of the water has evaporated.

Bronze for Brass Instruments.—The cheapest and simplest is undoubtedly a light coat of plumbago or black lead. After brushing the article with plumbago place it on a clear fire till it is made too hot to be touched. Apply a plate brush as soon as it ceases to be hot enough to burn the brush. A few strokes of the brush will produce a dark brown polish approaching black, but entirely distinct from the well known appearance of black lead. Lacquer with any desired tint.

The highest railway bridge in the world, that built for a branch of the New York, Lake Erie & Western company across Kiuzua chasm, fifteen miles south of Bradford, Pa., has been completed. The centre spans are 301 feet in height and the length of the structure is 2,060 feet.

PRACTICAL MECHANICS.

Wire Mauufacture.

Wire is drawn from rods of soft iron received from the rolling-mill, which have been specially rolled to about a quarter of an inch in thickness; they are cleaned in oil of vitriol, for the purpose of making the surface smooth, and a thin coating of lime is added superficially to facilitate the process of wire-drawing. The rods, having been sharpened a little at the ends, are pulled through a series of apertures in steel draw plates or dies, gradually diminishing in calibre until the required guage is obtained. These draw-plates are pierced with a regular graduation of holes from the largest to the smallest, the wire, as a matter of course, being augmented in length at the expense of its thickness. As it passes through the plate or die, the wire is drawn round a metal drum or block which somewhat tapers towards the top. The wire must be annealed from time to time, and care must be taken to leave it at last not too soft, nor yet too brittle; it is also required to be of different degrees of hardness, according to the purpose for which it is wanted. The speed at which wire may be prudently drawn out depends upon the ductility and and tenacity of the metal, but may be always increased the more the wire becomes attenuated, because its particles progressively assume more and more of the filamentous form, and accommodate themselves more readily to the extending force.

Upon entering a thin-wire mill numerous blocks are seen, rotating in somewhat peculiar and eccentric gyrations, especially where the wire has surrounded the conical-shapes at the top of many of the drums. The thin and bright wire, soft and pliant, contrasts widely with the thicker varieties, both serving, however, the useful purposes for which they are specially manufactured. The tin wire, wound closely on the blocks, shines like polished steel, and is silky to the touch, the variety of iron and copper being denoted by their distinctive metallic sheen. Although the thin wire appears to be marvellously fine—it being no thicker than horsehair, the thinnest wire drawn is often five degrees finer than the metallic thread we have described, and which, to the uninitiated, appears to be the acme of perfection in wire-drawing. The very thinnest, finest, and most beautiful wire made may justly be compared to the silky tresses of girlhood, or likened to threads of gossamer or floss silk, with all its brightness on the surface. Thus it will be seen that wire-drawing in the departments where the greatest skill is required becomes really an art, and is entitled to be classed with those artistic occupations in metallurgy which entitle the workers to that consideration which skilled artisans can justly claim. In another department are machines turning out staples completely made of thick wire, at the rate of two per second. The rapidity and decision with which this mechanical appliance works is remarkable, the staples falling into the receptacles, on completion, bent and pointed at each end, ready for use in erecting fences and for other purposes to which they are applied. These machines receive the heavy wire, which they point, bend and perfect at one blow, all the staples being of the regular approved form. Before the manufacture of staples from thick wire of good quality was accomplished by mechanical means they were hand-made at the forge, and the cost for labor was considerable. The introduction of staple making machines has not only tended materially to save labor and reduce the expense of production, but a greater degree of uniformity in the make has been assured. As the drawing proceeds, and the metal thread is elongated and reduced in rotundity it is requisite that it should be thoroughly annealed from time to time in order to give it the requisite tension. The wire cannot be drawn from the rod to a comparatively fine size without undergoing this operation, as the friction caused by passing it through the steel dies considerably hardens the metal, and fresh tension, as it were, has to be imparted, which is done by placing the wire in retorts, or in a cylinder placed in the ground vertically. The wire is then subjected to great heat, fire passing around it until the wire to be acted upon obtains a white heat, at which it is sustained a considerable time, and afterwards allowed gradually to cool. The wire then is in such a condition that it can be drawn until it is finished, or it becomes necessary to repeat the process. All wire has to be annealed, therefore this work is of primary consequence, and requires much skill, care and attention.

The rope and strand department is one of the most important in leading wire works. The rope-making and stranding machines whirl at a high rate of velocity. Strands of various kinds are made from three to seven "ply," and of any required thickness, the stranding machines running at very great speed, accomplishing 220 revolutions a minute. These machines usually contain seven bobbins, carrying about 1 cwt. As the appliance revolves the wire is paid off, and drawn round a block the requisite length of the coil. The rope-making machine is similar to that which forms the strands, but much larger and stronger. This extensive arrangement, although it appears to be somewhat unwieldy, rotates with nice precision, and accomplishes the work without the least difficulty, notwithstanding the apparent complication which the process, at first sight, appears to involve. The measures taken to secure the greatest degree of endurance are so effectual, that it is by no means surprising that this rope, of which the standing rigging of ships is now commonly made, has attained celebrity. Wire ropes are, strange as it may appear, considerably lighter than hempen ropes of equal tensile strength.

The wire netting department is an instructive and most interesting branch of several establishments we have visited. The work of netting wire by machinery is by no means complicated, and although the process is not easy to describe without illustrations we may mention that there are two movements which give uniformity to the wire; one of these movements pulls, as it were, just that short stretch of rigid wire which is plain in the netting, while the other twists the remainder, and this completes the hexagonal design. This pulling and twisting is repeated continually and coils of 50 and 150 yards in length are rapidly completed for the markets of the world. Formerly wire netting was made by hand, but since machinery has been introduced for the work, hand-made netting has been entirely superseded. In this branch the introduction of mechanism has been not only the means of lessening the cost of production materially, but greater strength has been imparted, the result being that wire netting worked by machinery is much preferred to that made by hand.

Special machines are used for barbed wire, which would require illustrations to render any description intelligible.

The galvanizing of wire may almost be regarded as a distinct branch of the business, the object being to render the completed wire impervious to rust. There is nothing in galvanizing to bewilder or puzzle the spectator who witnesses the process for the first time. The operation is remarkably simple, and may be easily described. The wire is first submerged in acid, which frees the surface from any extraneous particles, and leaves nothing but the thread of iron. After it is dried it is ready for the galvanizing bath, which contains about 20 tons of molten zinc. The bath in question is heated to the required temperature by coke, and the wire is gradually drawn through the zinc, a portion of which adheres to it, giving the surface a smooth coating of bright metal, thoroughly impervious to damp or climatic influences. The wind-sails, or "swifts," rotate with precision and regularity, paying out the wire which they hold gradually, and reeling it off into the bath in the same manner as cotton is wound off a bobbin. Perhaps the most interesting process is that which relates to wire netting. Spun in rolls of 50 yards in length, the netting is subjected to the influence of the galvanizing bath, which rapidly alters its complexion. The surface of this manufactured material is prepared or "pickled" in acid in the manner already described; the netting is then passed into the bath, the motion being under and upwards, with precisely the same results that follow the immersion of a single length of wire. The netting is almost black prior to dipping, but after it has been coated with zinc it emerges from the other side of the great tank bright and shining. The netting is drawn through the bath by machinery, which works with the most perfect ease and uniformity of action. The zinc used for the purpose of galvanizing is the purest Silesian that can be procured.

Making Files by Machinery.

The steel is made in lengths that will cut without waste. The bars come from the steel makers in the proper widths and thicknesses for the blanks from which the files are made. Being cut in lengths they are forged—the tangs and the taper, where taper is necessary to the shape of the file—and for this forging there are employed at one establishment twenty-one power hammers, comprising 11 Bradley hammers, 6 ordinary trip hammers, 3 Belden hammers, and one Grant hammer. These hammers have a capacity of 1,050 dozen per day. After the forging, the blanks must be ground for cutting. The process of file cutting by machinery is modern. Under the Bemot patent, the file blank lies on a lead bed, and is fed by rachet wheel and pawl, giving it intermittent forward movements, between which the chisel makes its cut. The chisel comes down with a springing stroke, very much like that of the human arm, the spring being given by a series of leaves of sheet steel, the number of the leaves and the thickness of the entire spring being adjusted to the style of the file to be cut. In the cutting of very fine files the spring for the blow of the cutter is quite light, being simply a coiled wire spring. These cutting machines give from 500 to 900 blows per minute, and cut over the surface of a file with such surprising ease.

INDUSTRIAL SCIENCE.

Wrought Iron.

When we think of any sort of material, beyond the working treatment of their mechanical properties, we seem to be in another world. Take, for example, a piece of common wrought iron. It seems to us as of the earth earthy; but, if we are closely questioned in regard to the reason for its various properties, we find that we scarcely know anything. Tracing it from the ore through its various stages until it is in the hands of the smith is comparatively easy. We know the natural law that governs its elasticity, the limit of its elasticity, its ultimate strength; that it can be welded; that it is ductile, and can be drawn out into a fine wire, that it is malleable, and can be spread out into a sheet, or worked round from the sheet into a goblet, and may be gathered back again, if by so doing it served any useful purpose; but when we think of the marvelous changes which have taken place among its molecules during the operation, we are lost in wonderland. To many minds, the piece of cold iron seems to be solid; under the pressure of the testing machine, it is shown to be an unstable fluid. When the smith has the misfortune to leave a piece too long in the fire, it vanishes; it has found evil companions. and gone off under an assumed name and in a new character. When a piece of iron is broken and carefully examined under a microscope, we can see that it is composed of fine crystals; but these crystals, we are told, are composed of innumerable molecules, which are not to be seen by the microscope, being smaller than the human mind can imagine; still, the smith feels himself under their influence. In homely words, he speaks of the iron being "red-short" or "cold-short," without thinking that he is on the threshold of some of the important secrets of nature. The steel maker can take advantage of the molecular properties. With heat he can push them asunder and infuse among them the subtle vapor of carbon, and the iron becomes steel, highly improved in most of its mechanical properties, and with an increase of strength and elasticity. It may be inferred that each iron molecule is a little world in itself, surrounded with a thin wrapping of infinite space, no single molecule being in actual contact with any other molecule. We have reached the limit of sub-division, so far as the engineer dare venture. The investigating philosopher, however, ventures much further with his speculations; he tries vainly to penetrate into the supposed ultimate atoms of matter of which the molecules are composed, but further we need not follow. Suffice to say, that a piece of common wrought iron is altogether a mystery, and teaches man the lesson of humility.

Papier-Mache.

Papier-mache, as every one who has a smattering of French is aware, means simply chewed paper, which at first thought would seem to be of little practical value, except in the fabrication of the missiles known to mischievous school boys as "spit-balls." But we have repeatedly had to chronicle the increasing use of paper in the arts. It may also claim to rival iron in the multiplicity of its industrial applications. In Europe it is employed to a considerable extent in architecture, from a complete church building in Bavaria (capable of seating a thousand persons), having columns, walls, altars, roof, and spire of papier-mache, to the finest traceries of a Gothic screen. Some of the most tasteful halls in Britain and on

the continent are finished in it, in preference to wood. The mantels, and the mirror frames they support, are of its composition; and, strange as it may seem, the very chandeliers, in their gilded elegance, are of this humble material. Its use in architecture can literally have no limit; for no one to-day can say what may not be made of it. In toys, tables, bijouterie of all kinds, we have examples of its extensive uses, and suggestions of future applications. Papier-mache never cracks, as wood, plaster, terra-cotta, etc., will do. In the same articles it can be made, if required, far lighter than plaster, terra-cotta, metal, or even wood. Neither heat nor cold affects it; it can be sawed, fitted, nailed, or screwed, quickly adjusted or removed, gilded, painted, marbleized, or bronzed. It can be made light as cork, or heavy as stone; never discolors by rust, as will iron; is not affected by temperature or oxygen, as is even zinc. It can be made for a given thickness stronger than any white or rare marbles, and is even tougher than slate, quite as hard, and will not chip corners nor crack off in strata. One of the great advantages of papier-mache is that it can be produced very cheaply. In architecture it can be supplied nearly at plaster price, and, taking into consideration the price of putting up, costs no more, and sometimes even less. This depends on the size of the ornament, the larger being cheaper in proportion. It can be made to imitate the rarest marbles, as it takes a polish superior even to slate, and costs not half as much as the preparation of plaster of Paris, known as scagliola, while it is infinitely stronger. Pedestals, colums, newel-posts, vases, clocks, and multifarious other articles are made of it in elegant and durable forms. Possibly, as a recent writer remarks, "when the forests of the globe are regarded as curiosities, and the remaining groves are preserved with the same care that has garded historic trees, the cast-off rags of mankind, and the otherwise useless weeds, reeds and grasses of the marsh and swamp will take the place of timber in construction, and many will welcome the change,if for nothing else than that it will obviate much of the nuisance of frequent repaintings."

The Use of Machinery.

It would appear ridiculous at this late day to question the value of special machinery with which to perform operations. The possession, however, of a device, called by courtesy a planer surfacer, moulder or sticker, is not alone sufficient to enable the owner to compete with his neighbor. Vast improvements have been and are being made in wood-working machinery, and new devices are being constantly brought forward to facilitate operations, or perform them in a superior manner. Where in former years lumber had to be passed through two, three and four machines before it became a finished product, now it is subjected to the action of but one machine, necessitating but one handling, while much enhancing the beauty of the work. The great cost in manufacturing is found in the necessity for employing human labor. Some thirty or thirty-five years ago, mechanics worked from sunrise to sunset, often making fourteen full hours of actual labor. A good mechanic could, in all these long hours, with jack and smoothing plane, dress 300 square feet of six inch boards, jointing one edge of each. To-day two men with a surfacing and matching machine can dress anywhere from 12,000 to 25,000 feet of flooring in ten hour's time. This does not indicate that fewer men are employed, on the contrary it indicates that more are kept busy. By increasing rapidity of production, you decrease the cost, and this being so, you stimulate demand, thus necessitating increased production, which signifies the employment of more men. To obtain profitable and satisfactory results from machinery, no matter of what kind, it is essential that it be always kept in good order. We have been in hundreds of planing mills where the surfacer was placed upon insufficient foundations, and where every vibration of the building was communicated to it. Under these circumstances, what can be anticipated but racking and straining of the machinery; causing it to run hard and imperfectly; to be sprung or twisted out of shape, and soon be irremediably injured. Too many have an idea that it will accommodate itself to circumstances, that once placed in position, no further care is necessary. Machinery requires intelligent care and watchfulness when in use.

SCIENCE AND INVENTION.

A New Application for Asbestos.—Mr. H. Geoffrey has brought to the notice of the French Academy of Sciences a specimen of copper wire insulated with asbestos and threaded through a lead pipe. This wire is said to have proved very serviceable for electric lighting, and experiments made by M. Henri Lippman, engineer of the Faure Accumulator Co., show that it will resist very powerful currents.

The Contraction of Metals in Melting.—F. Nies and A. Winkelmann have examined the density of metals in a solid or in a liquid state, and find that, contrary to the general accepted views on the subject, many melted metals expand when they solidify. The results of their experiments are embodied in a paper contributed to the Munich Academy of Sciences. Tin, slowly and carefully heated to its heating point, 2265 degrees Celsius, floated on melted tin, and rose to its surface even after it had been submerged. By attaching pieces of copper to the floating tin, it was found that the increase of density by melting over solid tin was .7 per cent., a difference which is almost as great as that between tin at the freezing and boiling point of water. Lead and cadmium did not yield as decisive a result. Zinc, however, behaved like tin, but showed only a contraction of .2 per cent. In the case of bismuth, the floating test is very easily carried out, as this metal shows as much as 3 per cent. Copper and iron showed a slight difference, the peculiarity in the case of iron being well known, and having been the subject of elaborate investigations by Wrightson in England.

Utilization of India Rubber Scraps.—Scraps of mackintosh and other india rubber coated fabrics have hitherto been useless because the india rubber could not be profitably extracted from them. An American inventor, however, finds that strong hot sulphuric or muriatic acid has no effect on the rubber, but a strong corrosive action on the textile fabrics, and he has taken out patents for a process of recovery in which he eats away the textile fabrics with these acids, preferring hydrochloric, as it forms more soluable salts with the zinc and whiting than sulphuric. If the original stuff be in lumps it is first softened with benzine.

Safety Shield for Circular Saws.—A new self-acting safety shield for circular saws, designed to guard against the constant danger which threatens the workmen, is made of a plate of iron or steel about as thick as the saw, and curved to its radius, broad enough to give sufficient firmness. It is placed at a given distance from the teeth of the saw, and is furnished with moveable plates and adjustment slides, and screws to suit the alterations in the diameter of the saw by wear, or the substitution of smaller for larger saws, or stuff deeper than the cutting part of the saw. The shield is attached to an arm hung upon a stud concentric with the saw mandrel, and is balanced with a counterpoise under the table. The semicircular shield is about one-and-a-half inches deep and the same thickness as the saw. The forward end is so formed that the piece of timber to be cut raises the shield, but the latter rests upon the timber and forms a guard which prevents the workman from bringing his hands or arms into contact with the cutting edge of the saw. As soon as the timber has passed from the saw the shield returns to its original position, entirely covering the saw, and so remains until raised by the next piece of timber.

A Novel Fire Box.—Mr. C. K. Villas, of Alstead, N. H., recently patented a reversible rotative fire box, consisting of a spherical chamber or box provided with perforated covers. By rocking this fire box to and fro by means of a crank, ashes and clinkers may be easily removed. The apertures in the covers may be so small that very little coal can escape with the ashes, and the objectionable process of dumping is thus entirely avoided. In building a fire the box is nearly filled with coal, which is kindled at the top; the apparatus is then reversed, bringing the fire under the coal, and in the same way when the fire goes out with the box nearly full of coal, the above operation may be repeated without special inconvenience. By whirling the box around rapidly the ashes may be completely removed and the fire extinguished when desired.

"Crackle" Glass.—An ingenious process for producing glass with an iced or cracked surface, suitable for many decorative purposes, has been invented in France by Bay. The product appears in the form of sheets or panes, one side of which is smooth and glossy, like common window glass, while the other is rough and filled with innumerable crevices giving it the frozen or cracked appearance so much admired for many decorative purposes. This peculiar cracked surface is obtained by covering the surface of the sheet on the table with a thick coating of some coarse-grained flux mixed to form a paste, or with a coating of some more easily fusible glass, and then subjecting it to the action of a strong fire, either open or in a muffle.

Improvement in Steam Boilers.—An improvement in boilers was lately patented by Mr. S. L. Hill, of Brooklyn, N. Y. In this boiler the inventor, by adding external water tubes, utilizes a great amount of heat that usually goes to waste, and thereby increases the capacity of the boiler without increasing the quantity of the fuel consumed. The boiler not only has this economical feature, but it is made safer and more durable by the addition of tubes. If the water contains any foreign matter likely to form sediment, it will be deposited in a horizontal pipe below the fire line.

Oiling Belts.—Care should be taken that belts are kept soft and pliable; and experience has taught us that the best article for this purpose for leather belting is good castor oil. It softensand at the same time removes all dirt and scales from the surface of the belt, thereby causing it to adhere the more closely to the pulley. Resin is sometimes used to prevet belts from slipping. While this may have the desired effect for the time, in the end it causes the very thing which the purpose is to prevent, by stiffening and hardening the belt, and causing a scale to gather on the face of the belt, thereby preventing the surface of the belt proper to come in contact with the pulley. After such scale has gathered on the belt by the use of resin, or from any other cause, castor oil will readily remove it. Belts, to give the best results, should have good attention.

The California wheat crop for 1882 is estimated at about 50,000,000 bushels—the greatest crop ever raised in the State, outside of 1880—against 45,151,932 bushels last year. The surplus of export is estimated at 1,134,500 tons, against 980,711 tons last year. The ocean freight charges on this surplus, if the rates average as high as they did last year (and the probabilities are that they will be higher), will amount to about $18,590,000.

The following is the August product of several of the leading Lake Superior copper mines, according to the Houghton *Mining Gazette:* Calumet and Hecla, 1,721 tons 150 lbs.; Quincy, 275½ tons; Franklin, 170½ tons; Atlantic, 151 tons; Allouez, 134 tons, 134 lbs.; Pewabic, 70⅛.

One of the most remarkable features about paper is its strength. A note of the Bank of England twisted into a kind of a rope can suspend as much as 329 pounds upon one end of it, and not be in the least injured.

Two companies have been formed in the City of Mexico for the establishment of a candle and soap factory on grand scale, and of a large iron foundry for the constructisn of iron bridges and metallic frames

---

Lithographic stone cost from 12 to 14 cents per pound, and is imported from Italy. Yet there is plenty of stone in Kentucky if it could only be reached by railroads.

A grain of iron may be divided into four million parts, and gold may be beaten so fine that it will take 1,360,000 leaves to make an inch in thickness.

The Portuguese Goverment has signed a contract for a cable from Lisbon to the American coast touching at the Azore Islands.

The Barrett Paper Mills, in Aiken county, S. C., are making fine paper out of the old field pine trees.

The Stonewall Cotton Factory near Enterprise, Miss., is turning out 12,000 yards of cloth per day.

The largest stone arch in the world is near Washington and is a 220 span.

REVIEWS.

ART AMATEUR for October: New York: 23 Union Square

The present number of this superb monthly has no less than seven large page supplement designs for plaques and music tiles, panel and stamped leather, all valuable as artistic designs. The frontispiece is a deck portrait plaque. The note book is a valuable feature, as noting art events and accomplishments in all countries. A grand page illustration is that of the genius of music. Another attraction is armorial windows. There is a London correspondence giving engravings from choice foreign pictures. "Decorative Furniture" is as rich in its illustrations as usual, and in this line the *Art Amateur* is doing a good service. This number is replete with subjects from galleries and studios. Ceramics and art needlework are skillfully treated.

MACHINE-MADE HORSESHOES.—The machinery generally adopted for making horseshoes other than by hand is that of Mr. Perkins, of Providence, R. I., The machinery is certainly ingenious and neat in its operation. The iron is rolled from scrap. In its final passage through the rolling-mill it comes out a grooved bar, suitable, when cut into lengths, for making so many pairs of shoes. In a series of machines it is quickly divided into the necessrary lengths, the holes are punched for the nails in each length and the ends are trimmed. When the time has come for fashioning the pair of shoes the length is split longitudinally and the separate pieces pieces sent again to be heated. On emerging from the furnace they are placed on a machine, which, by the simplest possible action of a steel tongue-like projection, bends the hot-plate between two upright rollers into a perfect horseshoe shape. The shoe is then subjected to such hammering or bevelling processes as its ultimate destination may demand. Cold shoeing seems now to have many advocates, and it is claimed for these machine-made shoes that they can be bent cold to fit the horse's foot, can be made ot any form or pattern for hot or cold fixing, and can of necessity be produced in great quantities at a cost which greatly reduces the expense of shoeing.

OHIO AS A LUMBER STATE.—Ohio is seldom taken into very serious consideration as a lumber-producing State, and seldom alluded to in this connection, yet the census figures show that Ohio has 2,325 lumber establishments, whose total capital is $8,000,000,and which employ 15,000 hands. Strange as it may appear,—for Ohio has never claimed to be a lumber State—but two States have a larger number of establishments, only four employ a larger number of hands, and but four employ a larger capital in business. The value of the logs cut per year in the Ohio establishments is put at $8,600,000, and is exceeded in value by but five States: Wisconsin, Pennsylvania, New York, Michigan and Indiana. Michigan of course heads the list with $30,000,000 as the value of logs at the mills, Pennsylvania next with $13,000,000, Wisconsin,$12,000,000, Indiana but a few thousand dollars ahead of Ohio. In number of feet board measure, or lumber produced, Ohio stands fourth in the list, having produced, according to those figures, over 900,000,000 feet during the year, only Wisconsin, Pennsylvania, New York, and Michigan surpassing it in amount. Besides this, Ohio manufactured 25,000,000 of shingles, and 50,000,000 laths, the total value being $13,800,000.

LIME PROCESS IN COAL MINING.—A new and interesting method, called the "lime process," has lately been discovered in England for breaking down coal in a mine without running any of the risks inseparable from blasting. Holes are drilled in the solid coal at intervals near the roof, and into these are inserted "cartridges" of highly compressed, very caustic lime. These cartridges are three inches in diameter, and of any desired length, but they are made with a groove into which a small iron pipe can be inserted. The hole being filled and the pipe inserted, it is plugged or tamped to prevent the escape of steam, and, a number being ready, a small force-pump is attached by a flexible tube to the pipe and the water forced in, which, escaping, wets the lime. The pipe is then closed by a stopcock, and the same operation repeated at the next hole. The result is the conversion of the water into steam, which itself tends to force the coal down; but after a time the lime swells with irresistible power, and, the sprags being removed, the coal comes down in large blocks. The operation of watering the lime is performed very rapidly, a few minutes sufficing to "fire" any required number of cartridges.

CLEVELAND BREAKWATER.—About 1,050 feet of crib work has been sunk this season in twenty nine feet of water. Nine hundred feet of the superstructure has been built upon that. This makes the present length of the lake arm 2,000 feet. The shore arm is 3,130 feet long. The total present length of the structure is therefore 5,130. The entire length of the breakwater, including both the shore and lake arms, will be 7,130 feet, so that about 2,000 feet remain yet to be constructed. There will be an anchorage of 180 acres beween the line of docks on the shore and the breakwater, in 140 acres of which there will be a depth of from seventeen to twenty-nine feet, with excellent anchorage. The bottom is of good strong clay and sand, which will render it quite impossible for a vessel to drag her anchor.

FLAMELESS COMBUSTION.—At the soiree of the Society of Chemical Industry at Owens College, Manchester, England, a new theory of combustion was practically illustrated by Mr. Thomas Fletcher, of Warrington, Lancashire. Taking a ball of iron wire, about three pounds in weight, Mr. Fletcher placed it on a slab of fire clay, and directing a blow-pipe flame upon it, he suddenly blew the flame out; the temperature increased so rapidly that in a few seconds the wrought iron fused and ran into drops, and this temperature was steadily maintained. The room was darkened, but the closest examination did not show a trace of flame, although the fact that the gas was bnrning was proved by repeatedly relighting and extinguishing it. The same experiment was repeated in another form, by directing the flameless heat into a small fire clay chamber, in which a refractory clay crucible, made especialy for nickel melting, was partially fused and worked into a ball, like soft putty; the sides of the fire clay chamber being at the same time fused. The heat was so tremendous that the blowpipe labratory, which was given up to Mr. Fletcher for the evening, was too warm to be agreeable, in spite of open windows and ventilators. How far this discovery can be utilized, remains yet to be seen, but it will appear that what is usually considered to be a sign of combustion, is really an indication of imperfect results, and the best duty is to be obtained only when flame is totally absent. It is certain that such temperatures, as obtained by Mr. Fletcher, without flame, have never previously been obtained with the fuel used, which was nothing more than a small gas supply from a quarter inch pipe, assisted by an air blast.

MOTIONS in drawing. writing, and all mechanical labor is from right to left in inferior races, and the opposite in more highly civilized ones.

MARKETS.

Office of TRADE REVIEW AND WESTERN MACHINIST.

FRIDAY EVENING, October 6.

FINANCIAL.

Business in commercial circles has been moderately active. There has been a fair borrowing demand for money, and discount rates are firm at 7@8 per cent. Money is obtained on prime collaterals at 6 per cent on time and 5 per cent. on call. There has been an active demand for Eastern exchange, and rates between banks are strong at par buying and par at 1-20 per cent. premium selling. Dealers buy commercial bills at 1-20 discount at par. Sterling exchange has been a little lower.

NEW YORK.—Money on call ranges from 12 to 20 per cent. Sterling exchange is lower; current rates are $8 85¼@4 86¼ for sight drafts, and $4.80¾@4.81¼ for 60-day bills. The dealings in railroad bonds have covered a larger than usual variety of issues, but mostly of a retail character. Prices generally have been lower, but in late transactions there were some recoveries.

IRON.

The product of most of the furnaces which make foundry iron is sold ahead, and consumers are well supplied. Values of pig iron rule steady and firm for prompt or early deliveries. Standard brands of No. 1 X Foundry are generally quoted $26, although future contracts could be placed for less, and some special makes are held 50 cents higher, while No. 2 X is obtainable at $23.50 to 24.50, according to brand and delivery. Bessemer pig is dull. The market for Scotch pig is firmer, owing to moderate stocks, and spot prices are high. Muck Bars are in active demand at $42@43. Charcoal blooms are moving freely at $68@70. As to Merchant Bars, buyers are satisfied that the weakness they looked for as a result of resumption, if it comes at all, will not affect the fall trade. There is a general anxiety to cover requirements for the rest of the year, and few mills are able to take orders for delivery earlier than the latter part of November. Storekeepers' quotation is $2.70. The implement men who during the iron strike had held off are sending in their orders to the mills on a scale which precludes any concession by the mill men. Stocks of merchant iron being well nigh depleted, a good demand is certain to be maintained for the rest of the year. Plate and tank are somewhat easier Manufacturers of plate and tank, sheet iron and wrought iron pipes and tubes will for a lengthened period be occupied in filling contracts held by them. Steel Blooms are dull. Scrap is active. The business in old rails is dull.

CINCINNATI.—Reported by Rogers Brown & Co. The tone of the market is easy. Shipments on contracts are running heavily, absorbing, with the new sales, the full product of the furnaces, car wheel iron alone excepted. Demand is moderate for all grades. Prices are without important change. On contracts involving large amounts for future delivery slight concessions are made. Reports from Glasgow, Middleboro, Belgian and French markets show activity and firmness in prices, and the same is true of New York and Philadelphia. Troubles in the Wheeling district have been arranged, and the mills were at work Monday, Oct. 2. The men preserve the old proportion of 25 cents above the Ptitsburgh scale. Prices at Pittsburgh and Wheeling are about a dollar lower than previous to the strike. We quote for cash: Hot Blast Foundry.—Hanging Rock, C. C., No. 1, $26.50@$27.00; Hanging Rock, C.C., No. 2, $25@$26.00; Southern No. 1, $24.50@$26.00; Strong Coke No. 1, $23.50@$24;00; Strong Coke No. 2, $22.00@$23.00; Strong Coke No. 3, $21.00@$22.00; Soft Stone Coal No. 1, $22.50@23.00; Soft Stone Coal No. 2, $21.50@$22.00; Forge—Strong Neutral No. 1 Mill, $21 00@$21.50; Cold Short No. 1 Mill, $20.00@$21.00. Car Wheel and Malleable—Hanging Rock C. B., $32@$34; Hanging Rock W. B., $25@$28; Southern Car Wheel Iron, $32@$34; Lake Superior Car Wheel Iron, $29@$31; Lake Superior Malleable, $28@31.

CINCINNATI—Reported by E. L. Harper & Co.—The market during the week has ruled quite active, but prices have not been well sustained, some concessions having been made to large consumers for liberal orders. The influx of excellent Southern Hot Blast Charcoal Irons has materially affected the prices of the "Hanging Rock" and "Superior" Charcoal products, and consumers of this class of iron are highly gratified with the prices ruling and orders are liberal. The resumption of the mills has not given the impetus to the trade anticipated by many. While the best grades of mill irons are scarce and the demand healthy, the supply seems sufficient for the orders entered and the output of the furnaces adequate for the future wants.

LEAD.

The supply of spot and future is firmly held at 5.15 cents. Refined is unchanged. St. Louis is quoted at $4.70 for hard, $4.75@4.80 for soft. Some sales have transpired in foreign brands at 5.20 cents.

COPPER.

A fair business has been done in Lake copper at 18¼c. Bids for large quantities at 17c. have been refused, but owing to the steady arrival of Arizona copper, users incline to believe that lower prices than those we quote will rule. Large sales of Arizona have taken place at 17½c. The London market is firmer; Chili bars are quoted at £70, and Best Selected at £75@£76.

SPELTER AND ZINC.

The market for foreign and domestic brands of spelter rules quiet and steady with moderate sales at 5¾ to 5¼ cents, according to brand and quantity. Jobbing parcels of zinc from store of domestic and foreign sheet are held at6¾ to 7 cents.

COAL.

The cooler weather has increased the demand for bituminous, and wholesale dealers are obtaining full card prices. Stocks are larger, but complaint is made of insufficiency of cars. A fair amount of shipments have been made. Orders for future deliveries are more freely given. A good trade is looked for during the rest of the year. Lake freights have advanced.

HARDWARE.

The market continues firm. The volume of business is fair, and inquiry brisk. There has been an active demand for nails, the price of 10d. to 60d. in carloads and over being $4. Nails are still scarce, and stocks imperfectly assorted. For agricultural implements, blacksmiths' and carpenters' tools there is a good business. For foreign hardware, which has undergone no change as to values, the demand is moderate.

LUMBER.

Large orders have been placed during the week, the greater quantity for fall building. Fine lumber has been in especial request. The distribution of lumber, though heavy, does not come up to the expectations that had been entertained. The decline in grain will serve to check somewhat the purchases The outlook, however, is fair. Dimension sizes and short lengths are somewhat weaker, under the influence of considerable arrivals, but finer grades of lumber and shingles maintain full rates. Choice hardwoods for furniture and decorative building purposes are being rapidly disposed of. Freights are hardening with the progress of the fall season.

WOOL.

Manufacturers continue to buy large quantities. In sales of domestic fleeces in the Eastern markets Ohio XX and above have brought 44c.

LUMBER.

PLANK, MIXED WIDTHS.
2 inch, 12, 14 and 16 feet, together.

A 1 and 2 uppers	$50
A 3	40
B	32
C	20
D	14
E	12

1¼ and 1⅜ inch.

A 1 and 2 uppers	$48
A 3	40
B select	32
C	20
D	14
E	12

BOARDS.
One Inch, mixed widths.

A 1 and 2 uppers	$44
A 3	36
B select	30
C	19
D	15
E	13

STOCK BOARDS.
12 Inches wide.

A 1 and 2 uppers	$45
A 3	38
B	32
C	21
D	16
E	13

STRIPS.
6 Inches wide.

A 1, 2, and 3	$42
B	32
C	22
D	16
E	12
Norway Fencing Strips	17
Norway Flooring Strips	25

WORKED LUMBER
FLOORING.

Flooring—A 3	$42
B	35
C	24
D	20
Norway Flooring—A 3	28
C	22
D	18
Matched Drop Siding, 6 inches—A 3	42
B	38
C	24
D	20

Beaded Ceiling $2 higher than Flooring.

One half inch Bevel Siding—A 1 and 2	24
A 3	20
B	18
Ash Flooring—A 1 and 2	40

BILL STUFF.

Small, joists, 12, 14 and 16 feet	$14
Timber, larger than 8x8 special.	
Timber, longer than 18 feet, adds about $1 per foot per M. extra.	
Cedar Posts, large	30 00
" " medium	25 00
" " small	$15 to 20 00

SHINGLES, LATH AND MILL WORK

Shingles XXX	$ 4 25
Clear Butts	3 25
Lath	2 75@3 00

Surfacing, one side, adds $1.25; two sides $1.50
Matching, flooring and drop sidings, $2.50.

LAKE FREIGHTS.

COAL.

Buffalo to Chicago	$.62½@.65
Toledo to Chicago	1.00
Cleveland to Chicago	70@75
Erie to Chicago	70@75
Oswego to Chicago	1.50
Fairhaven to Chicago	1.30
Buffalo to Millwaukee	70@75
Cleveland to "	70@75
Erie to Milwaukee	75
Buffalo to Racine	80
Buffalo to Kenosha	85

IRON ORE.

Marquette to Lake Erie ports	1.25
Escanaba to Lake Erie ports	90@95
Escanaba to Chicago	90@95
Marquette to Chicago	1.15@1.20

Cleveland Wholesale Prices.

HARDWARE.

Adzes.

Carpenter's.....per doz $18 40
Ship..... " " 18 75
Heavy railroad.... " " 19 50

Axes.

Hunt's.....℔ doz $ 9 50
Lippincott's Crown.℔ doz 9 00
Cut More.℔ doz 9 00
Peck's Double Bit..℔ doz 22 00
" Champion Blade ℔ doz 11 00

Anvils.

Eagle, Amer...per lb. 10c dis 20
Wright's..... 10¾c@11c
Armitage's Mouse Hole 9¾@9¾c
Trenton..... 10¾c
Wilkinson's..... 10¾c

Anvil Vise and Drill.

Millers Falls Co. $28 .....dis 20
Cheney Anvil and Vise.dis 25&2

Vises.

Solid Box, list of July 1, '79, dis 35
Solid "Crown" (A. H. Hildick).....40 to 100 lb, 15c net
Solid, Peter Wright's 15½
Solid, Wilkinson's..... 18½
Parallel, Parker's.....dis 40
Saw Filers, Hopkins' ℔ doz $17.50, dis 10
Reading.....dis 45&10
Cowell Hand Vises.....dis 20
Richardson's Vise and Anvil..... .....dis 25

Augurs and Bits.

C S cut augers .....dis 40&10
do do do bits..... 40&10
D C gimlet do Ives.... dis 50
Snells bits ..... dis 40
Russell Jennings' augers dis 16⅔ &10&10
Cook's pat augur.....40&10

Animal Pokes.

Berea, per doz..... .... 4 00
Eagle, per doz..... ..... 5 00

Apple Parers.

Domestic & Reading ℔ doz..$7 50
Turn Table..... ..... 6 00

Bolts.

Machine ..... dis 60
Bolt ends..... dis 60
Plow..... dis 50
Plow, R. B. & W..... dis 40
Cast Iron Barrel Shutter, etc.....dis 50&10
Cast Iron Chain (Sargent' list).....dis 60&10
Ives' Pat. Door Bolts.. dis 50
Wrought Barrel.....dis 55&10
Wrought Square.....dis 55&10
Wr'g't Shut'r, all iron, Stanley's list .....dis 50&10
Tire, R. B. & W., new list..... .....dis 70&10
Stove, American Screw Co.'s..... dis 40
Bolt Ends..... dis 60

Bellows.

Dis

Blacksmith's com new list, 45 ℔ct
Moulder's new list, dis 25 ℔ cent
Hand, new list, 25 per cent

Butts.

Dis

Wrought brass..... 65&10
Cast, loose joint..... 55
Pin, loose..... 50
Wrought, fast joint narrow..... 45
Wrought fast joint broad..... 45
Wrought loose joint broad..... 55
Wrought table and back flaps..... 45
Loose joint, without acorns..... 55
Ten per cent. extra dis for cash.

Cleveland Stamped Elbows

Genuine Russia Iron

4 inch per doz..... 4 50
4½ do do 5 50
5 do do 7 50
5½ do do 8 50
6 do do 9 50
do do 11 00

Planished American Russia Iron

inch, per doz..... 4 00
4½ do do 5 00
5 do do 6 50
5½ do do 7 50
6 do do 8 50
do do 9 50

Charcoal Iron

4 inch, per doz..... 2 00
4½ do do 2 50
5 do do 3 50
5½ do do 4 00
do do 4 50
do do 5 50

25 per cent

Chisels.

Hot and cold cutting.....℔ lb 30
Railroad track 30
Machinists..... 30
Mallet head 50
Cape..... 50
Packing 50
Stone cutters 50

Crowbars.

Cast steel .....℔ lb 8¼
Iron, steel points..... 6¼c

Cutlery, Pocket and Table.

Meriden Cutlery Co., table..net
Am. Miller Bros.' Cutlery Co.....dis 25
Humason & Beckley, pocket 33⅓
Naugatuck Cutlery Co...list net
Aaron Berkenshaw's pocket dis 25

Coopers' Tools.

Bradley's ..... dis 14@20
Barton's ..... dis 20

Chains.

Coil by cask.....

3-16	¼	5-16	⅜	7-16	½
10¼	9	8	7	6½	6¼

Drills and Drill Stocks.

Blacksmiths', each...$2.50 dis 10
Blacksmiths', self-feeding, each 7.50 dis 20
Breast, P. S. & W .....dis 20&10

Drawing Knives.

Witherby's .....dis 65@10
Nobles Mfgr. Co 15
Adjustable handle 20

Emery and Emery Paper.

Regular Numbers..... .℔ lb 6c
Flour and F. F.....℔ lb 4c
B. & A. Emery Paper..dis 30&5

Enamieled and Tinned Ware.

Kettles.....dis 50
Sauce Pans.....dis 25
Tinned Sauce Pans.....dis 50

Files.

Auburn...$5 to £. dis 35 pr cent
E. M. Boynton's, new list. dis 25
J. & Riley Carr .....4.50 to £.
Johnson & Bro. .....dis 30
Butcher's.....4.50 to £.
Walter Spencer & Co.'s "Diamond"..... .4.50 to £.
Fisher's.....4.75 to £.
Moss & Gamble.....4.50 to £.
H. Disston & Sons (new list)..... dis 40 per cent
Heller Bros.' Horse Rasps dis 25
Nicholson.....dis 40
New American.....dis 40
Union File Co.....dis 40

Grindstones.

Ohio.....1¼@1½ ℔ lb
Nova Scotia.....1¼@1½ ℔ lb

Hammers.

Maydole's .....dis 15
Cheney's.....dis 25
Hartford Hammer Co.....dis 20
Humason & Beckley.....dis 50
Verree..... ...dis 5
Magnetic Tack, Nos. 1, 2, 3, $1.25, $1.50 and $1.75, dis 25&10
Nelson Tool Works....dis 40&10
Warner & Noble's .....dis 5
Kip's .....dis 15
Yerkes & Plumb.....dis 15
Wilkinson's Smiths' 11¼c ℔ lb net

Hatchets.

Yerkes & Plumb:--Shingling,

Nos	1,	2,	3,

℔ doz $7 50, $8 00, $8 50, dis 25

Claw,

Nos	1,	2,	3,

℔ doz $8 25, $8 75, $9 25, dis 25

Lathing,

Nos	1,	2,	3,

℔ doz $7 50, $8 00, $8 50, dis 25

Nails.

10 to 60d $4 00
8 and 9d 25
6 and 7d..... 50
4 and 5d..... 75
3d 1 50
2d 2 75
3d fine 3 00
2d fine 3 75
⅞ inch 3 00
4d barrel 1 00
1¼ inch barrel nails..... 1 50
1½ do do do 1 75
1 do do do 2 50
⅞ do do do 3 00
Cut spikes, all sizes..... 25
Clinch nails, all sizes..... 1 75
Cash in 5 and box nails 75 cts advance
Finishing nails, $1 25 do
Tobacco nails, 50 cts do

Nuts and Washers

Nuts, square.....7c off list.
Nuts, hexagon..... 6c. off list.
Washers.....6c off list.

Picks.

Railroad, 4 to 5 lbs...doz $7 75
5 to 6 lbs.... 7 75
to 7 lbs.... 8 50
7 to 8 lbs..... 9 50
Railroad Tamping Pick.... 7 to 8 lbs. doz 13 50
Mill Picks per lb..... 75c

Rivets.

Iron ....dis 40
Tinned.....dis 40
Copper .....dis 33⅓

Squares.

Dis

Steel or iron, case lots.....50
Try squares and T bevels.....40

Spikes—WROUGHT

All lengths by ¼ inch 4½c
do do do 5-16 3½
do do do ⅜, 7-16 & ½ in 3¼

Shovels and Spades.

Ames' new list, July 1, 1881, ... dis 15
Old Colony.....dis 15
Remington's (Lowman's Patent).....dis 30
Rowland's .....dis 40 and 10
Griffiths ... ...dis 40&10

Saw Sets.

Boynton s patent X Cut, per doz $12; Hand Saw, per doz $10.....dis 20
Stillman's Genuine, per doz $3 50 and $5 50 .....dis 20
Stillman's Imitation, per dor $3 25 .....dis 20&10
Common Lever, per doz $2 dis 30&10
Leach's No. 0 $8; No. 1 $15; dis 15
Hammer, Hotchkiss $5 50, dis 10
" Bemis & Call Co.'s new patent .....dis 40&5
Bemis & Call Co.'s Lever and Spring Hammer..dis 30&5
Bemis & Call Co.'s Plate ..dis 10
" " Cross-cut dis 12½
Aiken's Genuine...$13, dis 50&10
" Imitation.....$7, dis 50
Hart's Patent Lever.....dis 20
Disston's Circular .....dis 40

Sad Irons.

From 4 to 10 lbs....per lb 3¾ net
Self-Heating.....℔ doz $9 net
" Tailors..℔ doz $18 net
Gleason's Shield and Toilet .....dis 25
Mrs. Pott's Irons, double pointed.....dis 35
Mrs. Pott's Irons, square back.....dis 35
Enterprise Star Irons.....dis 40
Combined Fluter and Sad Iron.....℔ doz $15, dis 15

Scales.

Hatch, Counter, No. 171....
℔ doz. $42, dis 37½&10
Union Platform.....$6, dis 45
Fairbanks' .....dis 20
Buffalo Scale Co.....dis 20&5
Forsyth Scale Co .....dis 25
Howe's.....dis 20&10
Chatillon's Eureka.....dis 25
Family Uu versal.....dis 50
Scale Beams..... dis 33⅓&10

Bag Holders.

Sprengle's Pat, $18.00 per doz. 40 per cent. dis.

Planes.

Ohio Tool Co .....dis 25
Sciota .....dis 30
Bailey's Pat. Adjstble. dis 20@25

Rules.

Stanley..... dis 66⅔ and 10

Sash Locks. Discount.

Payson Mnfg. Co. "Perfect"..42
Simmons' Sash Supporters ...20

Hinges.

Champion double acting spring hinges.....dis. 30
Screw & Strap 8@12 in, ...$6. net
Gravity Locking Blind Hinges, Sargeant & Co. 70&10

Screws. Dis

Flat head iron or steel per cent dis..... 30
Flat head brass..... 30
Round head iron or steel.. 25
Round head brass..... 20
Brass and Silver capped .. 40
Japanned, list of Plain Screws..... 20
Coach, patent Gimlet point, list per 100 60
Lag, taper points..... 60
Bed 10
Machine, flat head, iron .. 55
round head, iron 50
Bench, iron ..... 55&10
wood, beech, per doz $3 10
wood, hickory .....20&10

Valves. Dis.

Jenkins' Patent Gate Valves..35
" " Globe " ..40
" Standard Packing " ..20

Wrenches.

Coe's genuine ..... 40 & 10
Coe's imitation wrought bar..60
Mechanics' 60 and 10

Wire.

Brass and Copper.....dis 20
Bright & annealed, Nos. 0 @ 18 dis 50@52½
" " Nos. 19 @ 26 dis 60
" Nos. 27 @ 36 dis 65
Coppered.....Nos. 0 @ 18, dis 45
Galvanized, Nos. 0 @ 18, market list,..... dis 40
Tinned, Nos. 0 @ 18,.... dis 40@45
Cast steel..... dis 40
Tinned Broom Wire, Nos. 18 @ 25..... dis 55
Annealed Fence, Nos. 8 and 9 ..... dis 55@52½
Annealed Grape, Nos. 10 to 14..... dis 52½
Galvanized Telegraph, Nos. 7 to 9 ..... ℔ lb 7½c
Galvanized Telegraph, Nos. 10 to 11 ..... ℔ lb 8¼c
Galvanized Telegraph, No. 12 ..... ℔ lb 10½c
Fence staples .....℔ lb 5½@5¾c
Fence Staples, galvanized, ℔ lb 7@7¼c
Stubs Steel Wire... $7 00 to £
Barb Wire, painted 8½c
Barb Wire, galvanized 9¼c
Crucible Steel Ropes from ¾ in. at 9c to 1¼ in. at..... 52c
Best Selected Iron Ropes from 3-16 in. at 3c. to 1¼ in. at..... 33c

Boiler Plates.

("Gaylord"--Standard Quality.)
C. No. 1..... 4 50
C. H. No. 1 Sheil..... 4 75
C. H. No. 1, 50,000..... 5 25
C. H. No. 1, 55,000..... 5 75
C. H. No. 1 Flange..... 6 50
Firebox .....
T. S., 60,000 .....(as per).. 6 50
T. S., 65,000 .....(act of)..
Homo. Steel, 70,000 (of Cong).7 50
Heads, ¼c ℔ lb. extra.
N.B.—Eastern brands of boiler plate at from 2-10 to 3-10c ℔ lb less than above prices.

Sheet and Tank Rivets.

"Norway."
All sizes.....dis. 15

Boiler Rivets—"Albany."

½, ⅝, 11-16, and ¾ in. diam.5 50

Boiler Makers' Tools.

Doty's Power Shears ....net list
" Hand Lever Shears.net list
" Power Punch.....net list
" Hand Punch .....net list
Steel Screw Punch.....net list
Iron Screw Punch .....net list
Boiler Plate Rolls.....net list
Buffalo Forges & Blowers dis 20
Watson's " " net list
Spring Tube Expander....dis 15
Roller Tube Expander ..net list
National Tube Cleaner ...dis 20
Wire Flue Brushes .....net list
Anvils—"Peter Wright" 12¼ ℔ lb
Solid Box Vises ..... net list

Nuts, Bolts, etc.

Square & Hex. Nuts ....7 off list
Washers ..... list
Machine Bolts .....dis 60
Bolt Ends .....dis 60
Boiler Patch Bolts.....net list

Boiler Tubes.

"National" Standard Gauge 1 inch to 10 inch.....dis 37½
"National" Standard Gauge 11 inch to 15 inch .... dis 25
"National" Special Locomotive Tubes..... ...net list

IRON AND STEEL.

Flat Bar.

1¼ to 4 by ¼ to 1 inch..... 2 60
4¼ to 6 by ¼ to 1 inch..... 2 70
1¼ to 6 by 1¼ to 1¼ inch.... 3 00
1¼ &1¾ by ¼ to ¾..... 2 70
1 & 1¼ by ¼ to ¾..... 2 80
⅝ ¾ and ⅞ by ¼ to ½..... 3 00

Round.

1 to 1¼ inch 2 60
2 to 2⅝ 2 80
2¾ to 3¼ 3 10
3⅜ to 4 ..... 3 60
4⅛ to 4½ 4 10
4¾ to 5 ..... 4 30

Square.

1 to 1⅛ inch 2 60
2 to 2⅝ 2 80
2¾ to 3¼ 3 10
3⅜ to 4 ..... 3 60
⅜ to ½ 2 70

Heavy Band.

1¼ to 6 by ¼ and 5-16 inch. 2 80
1 to 1¼ by ¼ and 5-16 do 2 90
¾ to ⅞ by ¼ and 5-16 do 3 10
⅝ to ¾ by ¼ and 5-16 do 3 60

Half Oval and Half Round.

Wagon box iron ¾ and ⅞... 4 10
1-10c per lb extra will be charged for cutting to specified lengths

Light Band.

1¼ to 6 by ⅛ to 3-16..... 3 10

Hoops.

1¼ to 2 , Nos 16 to 18. ..... 3 50
1¼ to 4 do 13 to 15..... 3 40
1-10 extra for each gauge lighter

Sheet Iron.

No 22 to 24..... ..... 4 50
No 25 to 26..... 4 70
No 27..... 4 90
No 28 ..... 5 30

English Steel.

Best cast.....℔ lb 15½c
Extra cast..... 16½c
Round machinery, cast 10c
Swaged, cast 18c
Best double shear 15½c
Blister, 1st quality..... 13c
Refined tool steel..... 16½c
Spring calking ..... 7½@7½c
German steel, best 11c
2d quality 10c
3d quality 9c
Sheet cast steel, 1st quality 15½c
2d quality 14½c
3d quality 12½c

American Steel.

Best brands of refined cast steel, ⅜ to 2 inches....12c
Crucible cast 7c
Open-hearth ditto 4½c
Hammer cast steel 9c
Spring cast steel..... 7½c
Bessemer and open-hearth spring..... 5c
Ditto plow..... 4½c
Steel boiler plate ..... 6½@7c
Bessemer machinery...5 @6c
Spring and calking .....7½@7½c
Tire 5
Sleigh shoe..... 5

Bessemer Steel Tire.

⅜ to 1 by 3-32..... 4½ ℔ lb
⅜ to 1 by ½ to 5-32 ..... 4½ ℔ lb
⅜ to 1 by 3-16 to ⅝ ..... 4½ ℔ lb

Miscellaneous Cast Steel.

Auger and auger bit..... 1
Axle steel for wagons.....7
Frog points and plates.....8
Frog size bars.....8½
Pick, hammered.....10
Mattock, beveled.....9
Table cutlery.....7½
Trap spring steel.....10
Pike and cant hook.....9
Coal and granite.....8½

TINNER'S STOCK.

Tin.

Banca, ... per lb. 26c
Straits ..... " 26c
English ..... " 27c
Bar ..... " 27c

Tin Plate.

IC 12x12 charcoal .....$ 6 50
IC 14x20 do .....6 25@6 50
IX 14x20 do 8 25
DC 12½x17 do 6 00
DX 12½x17 do 8 00
DXX, 12½x17 do 10 00
DXXX, 12½x17 do..... 12 00
IC, 20x28 do 14 50
IX, 20x28 do 15 50
IC, 14x20, Best Roof..... 6 00
IX, 14x20, do 8 00
IC, 20x28 do 13 00
IX, 20x28 do 14 50
IC, 10x14 Best Coke..... 5 75

Solder.

Half and Half, in bars.....15½
No. 1 do 14½
Spelter Solder.....25

Pat Planished Sheet Iron.

[A] ..... per lb 10½c
[B] 9½c

Nos	10	15	21	25
to	14	20	24	& 26
Com	3-60	3-80	4-00	4-20
Char	5-60	5-60	6-00	6-20

Sheets over 28 in. wide ¼c extra

Zinc.

Sheet, cask..... 8c
Sheet, open..... ..... 8@ 8½

Tinners' Tools & Machines

Machines (P. S. & W.) list add 20
Tools (P. S. & W.) .....add 6

Plumbers', Steam and Gas Fitters' Supplies.

Wrought Iron Pipe.....dis 60.
Steam Brass Goods .....dis 45
Water " " .....dis 40
Enameled Pipe .....dis 65
Artesian Well Casing....net list
Hydraulic Tubes .....net list
Malleable Iron Fittings..net list
Cast Iron Fittings .....dis. 45
Globe Valves.....dis. 35
Angle Valves..... .....dis. 35
Check Valves.....dis. 45
Safety Valves.....dis. 35
Ludlow Gate Valves .....dis. 20
Ball Gauge Cocks (net per dozen)..... .....$15
Compression Gauge Cocks dis. 35
Montg'ry Gauge Cocks ..dis. 35
Register Gauge Cocks (net per piece) $1 00
Cylinder Cocks.....dis. 30
Air Cocks (net per dozen)...$2 75
Oil Cups..... dis. 30
Steam Gauges.....dis. 40
Water Gauges .....dis. 40
Scotch Glass Tubes .....dis. 50
Steam Whistles .....dis. 45
Pipe Tools .....special
Globe, Angle and Check Valves (Star's regrinding)..... dis. 25
Duplex Injectors .....net. 20
Soil Pipe & Fittings.....dis. 20
Sinks..... dis. 25
Bath tubs &c .....dis. 20

Babbitt Metal.

Babbit Metal, No. 4..... 8c
Babbot Metal, A No. 1.....12c
Babbit Metal, J. B. 85c
Babbit Metal, genuine 35c

LEAD.

American, ℔ lb..... 5½c
Bar, ℔ lb 6½c dis 10 per ct
Pipe, ℔ lb 7½c dis 10 per ct
Sheet, ℔ lb.. 8c dis 10 per ct
Tin-lined pipe ℔ lb 15c dis 10 pr ct
Shot Drop 7c; Buck.... 7c
Chilled Shot..... 8c

COPPER.

Lake Ingot..... 18@18¼c
Baltimore ..... 17½@17¾c
Arizona..... 17⅜@17½c

Sheathing Braziers Copper, Bolts, &c.

Brazier's Copper, ordinary sizes, 16 oz. per sq. foot, and over per lb.....30c
Brazier's Copper, ordinary sizes, under 16 oz. and over 12 oz. per sq. foot, per lb. 32c
Brazier's Copper, 10 oz and 12 oz. per sq. ft...per lb. 34c
Brazier's Copper lighter than 10 oz. per sq. ft...per lb. 36c
Circles less than 84 inches in diameter ..... per lb. 33c
Circles 84 inches in diameter and over .....per lb. 30c
Segment and Pattern sheets per lb. 33c
Locomotive Fire Box sheets per lb. 30c
Sheathing Copper, over 12 oz per sq. ft.... per lb. 28c
Bolt Copper ..... per lb. 30c
Copper Bottoms per lb. 31@32c

No copper is Sheathing except 14x10 inches, and not to exceed 34 oz. to the sq. ft.

Tinning.

14x18 ..... per sheet 6c

All other size sheets, 2½c per square foot For tinning both sides, double the above amount.

SCRAP IRON AND OLD METAL

DEALER'S SELLING PRICES.

	Net Tons.
No. 1 wrought scrap.....	$24
Sheet and hoop "	10@11
Cast scrap, (No. 1 heavy).	19
Cast Scrap (Stove Plate).	12

OLD METALS.

Old copper per lb.....	15c
No. 1 H. Brass per lb.....	14
Heavy yellow Brass do.....	12
Light Brass per lb.....	12
Scrap Zinc per lb.....	6½
Tea Lead per lb	4
Heavy Lead per lb	3

PIPE, WROUGHT.

Standard Wrought Iron Lap Welded Steam and Gas

Inside Diameter. Inches.	Plain, Price Per Foot.	Galvan or Enameled Per Foot.	Outside Diameter Inches.	Weight Per Foot.
⅛	08		.40	.24
¼	08	10 11	.54	.42
⅜	09	12	.67	.56
½	11	15	.84	.85
¾	13½	19	1.05	1.13
1	19	28	1.31	1.67
1¼	27	40	1.66	2.26
1½	33	47	1.90	2.69
2	46	64	2.37	3.66
2½	75	1 00	2.87	5.77
3	95	1 30	3.50	7.55
3½	1 25	1 70	4 00	9.05
4	1 50	2 05	4.50	10.73
4½	1 75	2 40	5 00	12.49
5	2 25	3 00	5.56	14.56
6	2 75	4 00	6.62	18.76
7	3 75	....	7.62	23.00
8	4 75	....	8.62	28.00
9	6 50	....	9.68	34.40
10	8 00	....	10.75	40.64
12	12 00	....		54.65

Discount, 62½ per cent; galvanized, 62½ per cent.

BRASS.

Cash prices for Roll and Sheet Brass. For less quantity than 100 lbs. add 3c per lb.

High Brass.

All Nos not thinner than No. 28, wider than 2 in. not wider than 14 inch 30c
All Nos. to No. 28, inclusive, and widths over 14 to 20 in. inclusive 35c
All Nos. to No. 28, inclusive, and widths over 20 to 30 in. inclusive 38c
½c per lb. advance on each No. above Nos. 28 to 38, inclusive.
All Brass thinner than No. 8 is Platers' Brass at 55c
Sheets 24x48, and all sheets cut to particular sizes and lengths under 30 inches, in width wider than 2 inches .37c

Low Brass.

4c per lb. more than High Brass.
Gilding metal 8c per lb. more than High Brass.
Platers' or Gold Metal

In Bars	48c
Sawed	51c
Planed or Polished..	54c

For Slitting.

Metal in width in. to ½ in. to No. 28, inclusive, 1c per lb advance.
Metal, in width 2 in. to 1 in. thinner than No. 28, 2c per lb. advance
Metal, in width ⅛ in. to ¼ in. thinner than No. 28, 5c per lb. advance.
Metal ¼ in. in width and less, 10c per lb. advance.
Any of the above widths cut to particular lengths, add 7c per pound.

COAL,

WHOLESALE.

Wholesale f.o.b. vessel at Cleveland:

Carbon Hill and Monday Creek.....	$2 65
Massillon	2 75@ 2 85
Brier Hill.....	3 25@3 75
Pittsburgh	3 00
Salineville.....	2 25
Tuscarawas.....	2 25

RETAIL.—Delivered.

Massillon Lump.....	$4 00
" Nut.....	3 75
Carbon Hill and Monday Creek, lump	3 75
Carbon Hill and Monday Creek, nut	3 50

75c less on cars by car load.

Anthracite Stove and Chestnut	7 15
Egg and grate	6 00

GLASS.

(Per box of 50 feet)

SINGLE THICKNESS

6x8 to 10x15	
11x14 to 15x24.....	8 50
16x24 to 20x28.....	9 75
15x34 to 24x30.....	10 75
26x28 to 24x36.....	11 50
26x36 to 26x44.....	18
26x46 to 30x50	14 00

DOUBLE THICKNESS

6x8 to 10x15.....	11 7
11x14 to 15x24.....	13 25
16x24 to 20x28.....	15 75
15x34 to 24x30.....	17 25
26x28 to 24x36.....	18 50
26x36 to 26x44.....	21 25
30x50.....	22 50
30x52 to 30x54.....	23 25
30x56 to 34x56.....	25 00
34x58 to 34x60.....	27 75
36x60 to 40x60.....	30 00
Dis 60 & 15 single, 60 & 20 double	

OILS.

Pure Oils. packages included	
Sperm, winter bleached per gal.....	1 25
Whale, winter bleached per gal.....	63
Straits	50@53
"A" oil for tanner's use	35 @40
Lard oil extra W S....1 08@1 10	
do No 1 do.....	82@87
do No 2 do.....	72@77
Tallow oil	75
Neatsfoot oil pure....	90@95
do No 1.....	80@85
Linseed oil, raw	54
do do boiled.....	57
Cotton seed oil white..	64 @ 66
do do yellow	60 @ 63
West Virginia lubricating 28 deg.....	29c@30c
Pure Mecca	85@ 90
Paraffine oil winter pressed.....	25@ 30
Machinery.....	40
Engine	50
Miners' oil.....	40@45
Drilling oil	40

Hides and Leather.

Prime cured hides,	8½@9
Green hides	5@6
Bull, scrubby, badly scored or damaged, cured, two-thirds price.	
Prime dry hides.....	12@14
Horse hides, green ...	No 1, $2 50
Prime cured veal calf,	12@13½
Ohio Deacon S, salted.	60
Pelts, wool on ...	25@30
Fresh slaughter sheep	30@$1 50
Fresh slaughter lambs	50@60
Green calf skins	13
Hemlock rough	33@34
Oak harness	34@38
Oak sole	37@
Union hanres.....	31@

MERCHANT & COMPANY,

Manufacturers of

SOLDER,

525 Arch St., Philadelphia.

WE ASK THE PATRONAGE OF THE TRADE FOR OUR SOLDER FOR THE FOLLOWING REASONS:

1st.—All our Solder is made on our premises and under our personal supervision.

2nd.—We guarantee proportions specified or do not require payment.

3rd.—We use nothing but best selected brands of new Lead and Pig Tin.

4th.—We do not use animony or any other metal to dress up the face of Solder.

5th.—We offer to make any specified mixture of Tin and Lead, guaranteeing same.

6th.—That we believe the question between manufacturer and consumer of Solder is not so much price as quality.

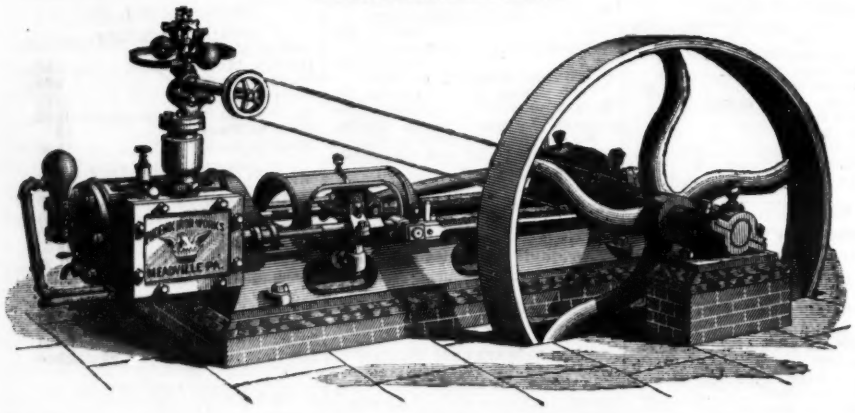
7th.—That we believe our M. F. Solder is the best ever offered to the trade, and cannot be surpassed.

8th.—That we guarantee our prices as low for same quality as any house in the country

MERCHANT & CO.

PHŒNIX IRON WORKS,

MANUFACTURERS OF



Portable and Stationary Engines, Boilers, and Circular Saw Mills.

MEADVILLE, PA.

The American Tool and Machine Company.,

84 Kingston street, Boston Mass.,

—Manufacturers of the—

Celebrated Cabinet Turret, Screw Chasing, and Hand Lathes,

CHUCK'S SLIDE RESTS

And Valve Milling Machines for Brass Finishers.

Also the D. M. Weston Hydro Extractors

For Woolen and Cotton Mills, Hotels, Laundries, etc.

BENJAMIN F. RADFORD, Sup't.

Dayton Malleable Iron Co.,

Manufacturers of

Air Furnace Iron.

A full line of Carriage and Plow Hardware kept in stock.

☞Catalogues for the Trade.

Engines, Hoisting Machines

And General Machinery.

EXTRA HEAVY STEAM ENGINES and other machinery adapted for Rolling Mills, Forges, Mines, &c., specially designed to suit local requirements.

Light and Heavy Hoisting Machinery

of every description, adapted for either slow or rapid hoisting, and with or without Friction Clutches or Steam boilers, &c. I am now prepared to manufacture my recently designed

FRICTION BAND HOIST,

Specially designed for rapid hoisting, which for cheapness, simplicity, driving capacity, ease and reliability of operation will be found superior to any other hoisting machine in the market. Patterns changed or new patterns made in any case to suit local requirements.

To parties wishing to build newly designed machinery I give especial attention. Designs and estimates for machinery, as a base for negotiations, forwarded on application. Promptitude guaranteed. Correspondence solicited.

W. H. THOMPSON,
Phoenix Iron Works, Wason Street, Cleveland, Ohio.

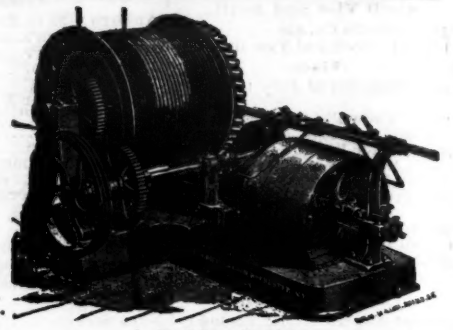
Freight and Passenger

Elevators.

L. S. GRAVES & SON,

Cor. Center and Frank Streets,

ROCHESTER, N. Y.

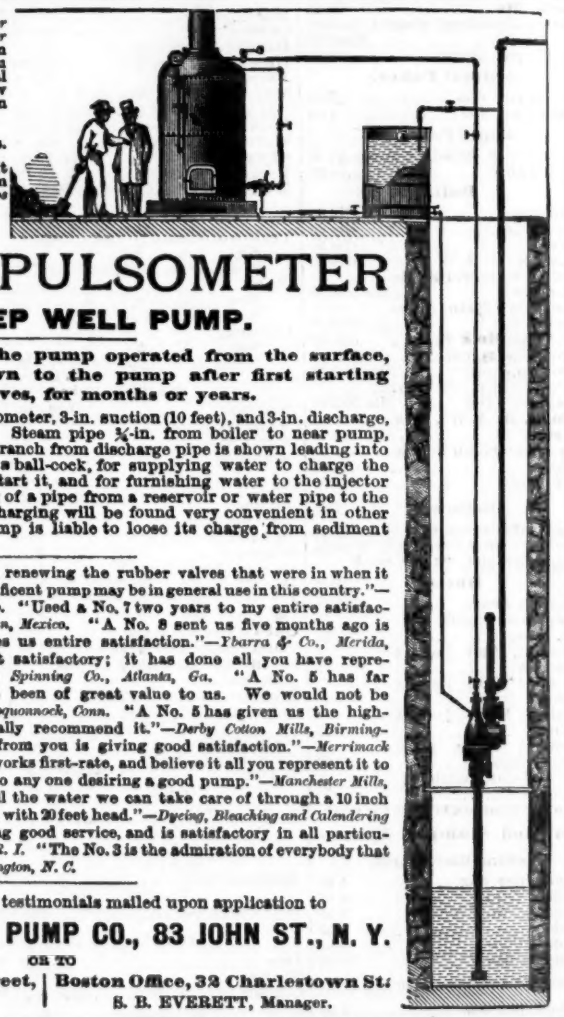


No. 3 Screw Machine.

and for our Catalogue.

"Your pump does in *one quarter hour what our old pump under a 10-horse power engine did in an hour*, and it should soon pay for itself in saving of fuel. You may as well close your Testimonial Book, as the New Pulsometers are now talking for themselves and for you in every direction."
Wetherill & Bro., White Lead Works, Philadelphia, Pa.

"A No. 7 gives entire satisfaction, it is placed at a depth of 60 feet from the surface of the ground." *Marcos Duarte, Merida, Yucatan, Mexico.*



THE NEW PULSOMETER

AS A DEEP WELL PUMP.

The well covered up. The pump operated from the surface, with no need of going down to the pump after first starting and regulating the air valves, for months or years.

This cut shows a No. 5 New Pulsometer, 3-in. suction (10 feet), and 3-in. discharge, raising water 50 feet out of a well. Steam pipe ¾-in. from boiler to near pump, where it is reduced to ½-inch. A branch from discharge pipe is shown leading into a hogshead or tank, controlled by a ball-cock, for supplying water to charge the pump before turning on steam to start it, and for furnishing water to the injector for feeding the boiler. The leading of a pipe from a reservoir or water pipe to the middle chamber of the pump for charging will be found very convenient in other situations, especially where the pump is liable to loose its charge from sediment getting under the valves.

"A No. 8 has run two years without renewing the rubber valves that were in when it arrived. It is hoped that such a magnificent pump may be in general use in this country."—*Eulogio Duarte, Merida, Yucatan, Mexico.* "Used a No. 7 two years to my entire satisfaction."—*Antonino Bolio, Merida, Yucatan, Mexico.* "A No. 8 sent us five months ago is working on our plantation and gives us entire satisfaction."—*Ybarra & Co., Merida, Yucatan, Mexico.* "The No. 6 is most satisfactory; it has done all you have represented it would do."—*Fulton Cotton Spinning Co., Atlanta, Ga.* "A No. 5 has far exceeded our expectations and has been of great value to us. We would not be without it."—*Tunxis Worsted Mills, Poquonnock, Conn.* "A No. 5 has given us the highest satisfaction, and we can cordially recommend it."—*Derby Cotton Mills, Birmingham, Conn.* "The No. 7 purchased from you is giving good satisfaction."—*Merrimack Manf'g Co., Lowell, Mass.* "The No. 7 works first-rate, and believe it all you represent it to be, and can cheerfully recommend it to any one desiring a good pump."—*Manchester Mills, Manchester, N. H.* "A No. 7 gives us all the water we can take care of through a 10 inch pipe, one mile and a quarter in length, with 20 feet head."—*Dyeing, Bleaching and Calendering Co., Providence, R. I.* "A No. 5 is doing good service, and is satisfactory in all particulars."—*Union Wadding Co., Pawtucket, R. I.* "The No. 3 is the admiration of everybody that sees it."—*G. F. Alderman & Bro., Wilmington, N. C.*

Descriptive book with prices and testimonials mailed upon application to

PULSOMETER STEAM PUMP CO., 83 JOHN ST., N. Y.

OR TO

Chicago Office, 193 Lake Street, FRANK GRAY, Manager.

Boston Office, 32 Charlestown St. S. B. EVERETT, Manager.

THE MORGAN

Variable Blast Water Tuyere Iron.

With the front plate removed, showing the rotating air tubes through which four different currents of air may be passed thereby making any sized fire from two to eighteen in. diameter.

I. actually saves one-half of the coal; makes an intense heat just where it is needed, and burns no coal unnecessarily Always gives a centre blast, and cleans all the dirt from the fire. Supplies hot water We also furnish a Tuyere on same principle without Water Attachment. All goods guaranteed to please or no sale. Catalogue sent free. Address,

A. W. MORGAN & CO.
52 Vance Block, Indianapolis, Ind.

COATES'

"Independent Lock Lever"

HAY AND GRAIN RAKE.

Patented August, 1867, January, 1875, June, 1875, and November, 1876. 60,000 now in use. Light touch of lever and driver's weight dumps it. Best self-dump in market. Twenty steel teeth. No complicated ratchet wheels, friction bands or other horse machinery needed to operate it. A small boy rakes easily twenty acres per day with the Coates' Lock Lever. Send for circulars.

A. W. COATES & CO.
Alliance, Ohio.

Cleveland Business Directory.

Assayers and Analytical Chemists.

JUDSON, W. E, Ana ytical Chemist, 8 Cushing Block.

Bolt and Nut Works.

HOTCHKISS & GAYLORD, manuf'rs. Machine, Plow & Elevator Bolts, Coach Screws.

Boiler Makers.

SMITH & TEACHOUT — (Established 1857.) Boiler, Tanks, Stills etc. 439 Broadway.

Bridge Builders.

BUCKEYE BRIDGE AND BOILER WORKS mfrs of Arch & Truss Bridges, Boiler Tanks and Oil Stills. Bet. Wasson St. and Case Ave.

Coal and Iron Exchange.

JACKSON IRON CO. Iron Ore and Pig Iron. Rooms 8 and 9. Fayette Brown, Gen. Agent.

RHODES & CO. Coal, Iron Ore an Pig Iron. Rooms 1 and 2.

Carriage Blacksmith.

STRIEBEL, CHAS. manfac'r. of Carriages and Wagons and platform trucks. Horse shoeing and general blacksmithing .98 Woodland ave.

Carriage Bolts.

THE COLWELL & COLLINS NORWAY BOLT CO., manufacturers of Philadelphia Carriage and Tire Bolts.

Church and School Furnture.

FAULHABER, GEO. manufacturer of School and Church Furniture. Fine Hard Wood work a specialty. 203 Ontario Street.

Custom Boots and Shoes.

ROONEY, JOHN manufacturer of hand-made Boots & Shoes, custom made and warranted 177 Ontario Street.

Carriage Repository.

GREENE'S, J. O., Carriage Repository, 408 Superior street and 52, 54 & 56 Rockwell street, dealer in Fine Carriages. Repair shop in connection.

SLATER, G. A., Carriage dealer, sells the best work for the lowest price. A fine assortment always on hand. Repository 365 Euclid Avenue.

Coal and Pig Iron.

ANDREWS, HITCHCOCK & CO., Briar Hill Coal and Pig Iron. 122 Water Street.

Electrical,

ELECTRIC SUPPLY CO. manfrs and dealers in Electric Burglar Alarms, Annunciators, Cell Bells and Batteries. Telephone lines built and repaired. 145 Seneca Street.

Fresco Artists.

KEMMER & KUSHMAN DECORATIVE CO., Fresco Artists, Fine Modern Wall Papers. 338 Euclid ave.

Foundries.

BOWLER & CO., Car Wheels, Patent Chilled Frogs, and all kinds of castings. 9 Winter.

CLEVELAND MALLEABLE IRON CO., manufacturers Malleable Iron Castins.

LAKE SHORE FOUNDRY, Water and Gas Pipe, Light and Heavy Castings. Alabama st.

TAYLOR & BOGGIS, successors to H. & H. F. Taylor, Iron Founders, 65 to 73 Central Way.

VIADUCT FOUNDRY COM'Y, Aenis, Carlin & Strangward manfrs of Machinery Castings Fine Light Castings a Specialty. Office & Works 11 13 15 and 17 Detroit Strert, near Center.

FITZSIMONS WM. & SON, Rolling Mill and Machinery castings. Rolls a Specialty. No. 435 Broadway.

File and Saw Works.

PARKIN, W. H. & CO., Hand-cut Files and Rasps, dealers in Disston's saws, 11 So. Water

Flue Cleaner.

CLEVELAND FLUE CLEANER M'F'G. CO. manufacturer of Aitchison & Doolittle's Patent Steam Flue Cleaner, 23 & 24 Power Block.

Hotels.

FOREST CITY HOUSE, cor. Public Square and Superior st., Terrill & Ingersoll, Props.

KENNARD HOUSE, D. McClasky, Prop.

NEW ENGLAND HOTEL, Water st., W. W. Wolcott, Prop. Refitted and refurnished.

STRIEBINGER HOUSE, between Ontario and Seneca sts. $2.00 per day. Hawley & Langton

CITY HOTEL, Seneca street. H. B. West, proprietor. $1.50 per day.

Hides, Pelts and Leather.

DENNISON BROS., dealers in Hides, Pelts, Furs and Tallow, 48 and 50 River street.

Hardwood Lumber.

MARTIN, J. T. dealer in Hardwood Lumber, Stone's Levee, near Central Way.

Lumber.

WOODS, PERRY & CO., manufacturers and dealers in Lumber, Lath, etc., 5 Carter st.

FISHER, WILSON & CO., wholesale lumber dealers (pine & hard wood), rough and dressed lumber, timber, lath, shingles, etc. 47 Central Way

KRAUSE, C. A., & SON, wholesale and retail dealers in lumber. Yards cor. Superior and Wason and 281 Merwin streets.

Cleveland Business Directory.

Hardware and Iron.

BINGHAM, WM. & CO., Hardware, Iron, Nails and Metals, 148 and 150 Water street.

CLEVELAND ROLLING MILL CO., manuf'rs. of Steel and Iron Wire and Steel Tire.

WORTHINGTON, GEO. & CO., Hardware and Dealers in Metals, Water street.

Lime Manufacturers.

RUSSELL LIME CO., manufacturers of White Lime; also dealers in Plaster, Cement, etc. 85 Elm street.

Machinery and Boilers.

CLEVELAND STEAM FURNACE CO., Engines and Boilers, cor. Detroit and Center sts.

KRITCH, K. E. Metal Pattern Maker. Small machinery repaired. Lawn Mower sharpening a specialty. 42 South Water Street.

Machinery Depot.

CLEVELAND MACHINERY DEPOT, (now National Machinery Depot.) The largest stock of New and Second-hand Engines, Boilers and Machinists' Tools. Shop and Warehouse corner Bond and Superior streets.

Mercantile Agency.

THE MERCANTILE AGENCY. R. G. Dun & Co. proprietors. 121 Superior street.

Oil Manufacturers.

AMERICAN LUBRICATING OIL CO., manufacturers of lubricating oils, 23 Euclid ave.

Pattern and Model Makers.

WHITTINGHAM, J. & C., Metal Pattern and Model makers. 52 Canal Street.

REID, J. C., Pattern and Model Maker. 52 Canal Street., (Up Stairs.)

COTTRELL & CO., W. L., Pattern Makers, 58 Center street.

STAIR BUILDER.

PFEIL, CHAS, Stair Builder; Hard Wood Mantles and Office Railing. Works, 49 & 51 Canal street, Cleveland, Ohio.

JOHNSON & PURSER, Stair Builders, and manuf'rs of Mantels, Odd Pieces of Furniture, &c. 30 West street, up stairs.

Steel Stamps and Stencils.

FLEHARTY, J. H. & CO., Rubber Stamps, Seals, Stencils. 197 Superior street.

Steam Furnaces.

CUYAHOGA STEAM FURNACE CO., Manfrs of Land and Marine Engines. Machinery for Blast Furnaces, Rolling Mills, Bessemer Steel Works, &c. Mill-Gearing and all kinds of Castings, Foundry, Machine and Boiler Shops.

Trunks and Valices.

FABER, J. manuf. Trunk, Traveling Bags and Ladies' Fine Satchels. Sample Trunks and Cases a Specialty. 56 Public Square.

Vessel Agents.

WEBB, H. J. & CO., Ship Brokers and Vessel agents. 17 & 18 Board of Trade Building. 122 Water Street.

Wood Carving.

HERKOMMER, J., Carver and Ornamenter in Composition. 225 Erie street.

Business Directory.

Akron, O.

AKRON IRON CO., manufacture best Common, Refined and Charcoal Iron.

CASCADE HOUSE, cor. Mill and Summit sts., near Depot. J. Downie, Prop.

MCNEIL, J. C., Steam Boilers, Heavy Sheet Iron Work. Repairing promptly executed.

PERKINS, C. E., dealer in Agricultural Implements, machinery, and Manufacturers' Ag'nt

TAPLIN, RICE & CO., manuf'rs. of Stoves and Hollow Ware, dealers in Tinners' Stock, etc.

WEBSTER, CAMP & LANE MACHINE CO., Founders and Machinists, 12 Main street.

AKRON POLISHING & PLATING WORKS. Man'f'rs of solid leather wheels for polishers.

Alliance, O.

ARLINGTON HOUSE, cor. Main and Liberty Streets. Centrally located. Sample Room for Commercial Travellers. H. S. Adams, proprietor

MCFARLAND, J. W. Engine and Machine Builder, and General Machine Jobbing.

Buffalo, N. Y.

SANDS, PAUL, Marine and Stationary Steam Engine Works mfr. of drilling mact ines, foot and power lathes. 70 Columbia street.

EMPIRE STATE MF'G CO., O. F. Swift, prop'r, manfr of Fluters, Sad Irons, Spun Copper & Half Copper Tea Kettles. Washington, cor. Ohio

WHITE, L. & I, J. manf'r's of Coopers' Tools, Carpenters' Tools, and Ship Tools. Also manf'r's of Planer Knives and Machine Cutters to order. 310, 312, 314 Exchange street.

THE BUFFALO NUT AND BOLT CO. [Limited.] Manufrs. of Hot Pressed Nuts, Bolts, Washers, Rivets, &c. No. 226 Ohio Street.

Cuyahoga Falls, O.

THOMAS BROTHERS, manfrs of Ohio Stone Ware. Cuyahoga Falls Stone Ware Factory, cor. Main and Broad streets,

TURNER, VAUGHN & TAYLOR, manufacture engines, presses and grinding machinery for clay; also paper, chain, wire and flour mill machinery. Send for Circulars and price list.

SNYDER, H. wholesale manu acturer of Sash, Doors, Blinds, &c. Send for Price Lists.

THE CUYAHOGA FORGE AND IRON CO., manfrs. of every description Car, Truck and Driving Axles, Forging, Shafting, &c.

Business Directory.

Canal Dover, O.

HECKMAN, E., manufr. and dealer in harness leather, upper, kipp and calf. Also, manufacturer & dealer in prime English Dairy cheese. Highest market cash price paid for hides.

Columbus, O.

PAT. ADJUSTABLE WINDOW CURTAIN Cornice, manufactured by Strader's Curtain Cornice Works.

ROYCE & PULLING manufrs of Patent Steam Pumps for all purposes. Store room 30 High street. Works Nos. 5 and 7 Scioto street.

U. S. CARRIAGE CO. builders of fine Carriages, Buggies and Phætons. Salesrooms and Office 257, 259 and 261 Fourth street.

REYNOLDS BROS., manufacturers of hand-cut Files and Rasps. Old files re-cut. Send for Price List.

CITY BOILER WORKS, manfrs of Stationary, Portable and Locomotive Steam Boilers. All work warranted. Borger Bros. & Co.

MURRAY, HAYDEN & CO., manfrs of Malleable Iron. Cor. Randolph & West streets.

Canton, O.

DIEBOLD SAFE & LOCK CO., manuf'rs. Safes, Locks, Bank and Safe Deposit Works.

NOVELTY IRON WORKS, Mill work, Shafting, engines, Imperial job printing press, etc

NEW AMERICAN HOUSE, Canton. Fred. Hipp, Prop.

EBERSOLE & KAILEY, Machine and Jobbing Shops. Gearing for Patterns or Machinery a specialty. Models of all kinds made & repaired.

Erie, Pa.

GUNNISON, A. B., wholesale manufacturer of Wood Pumps. 233 East Twenty-Second St.

BALL ENGINE CO., limited, manufacturers of Automatic Engines of 15 to 30 horse power

NOBLE SEWING MACHINE CO. manfrs of the New Noble Sewing Machine. Send for circulars and prices.

A. B. FELGEMAKER & CO. Church Organ builders. Descriptive catalogue furnished on application.

Geneva, O.

THE ENTERPRISE MACHINE CO., L. L. Crane, Pres't, manfrs of Machinists' Tools and Machinery. Gear Cutting a specialty.

Louisville, Ky,

HAIGHT, ROBERT, Gold, Silver and Nickel Plating and Brass Finishing Shop. Car Trimmings and Steamboat work a specialty. 1 West Market street

Lima, O.

LIMA HOUSE, centrally located; telegraph office in the house. J. Goldsmith, Prop.

Massillon, O.

CITY CARRIAGE WORKS, P. H. Young, prop. manfact'r of Carriages, Phætons and Spring Wagons. Work warranted. Cor. Tremont & Erie.

Meadville, Pa.

CURRY & CO. general jobbers in Castings of al kinds.

Olean, N. Y.

MYRICK BROS. & CO., manufact'rs Engines and Boilers, oil drilling tools, rig irons, etc.

Oil City, Pa.

REID, JOS. Machinist, steam engine and pump repairing. Brass and sron castings, light and heavy, made on short notice.

Pittsburgh, Pa.

PRINTING PRESSES. W. A. Bunting, manufacturers' agent. Printers supplies, type, cards. 42½ Sixth Street. [Up stairs.]

BAIR & GAZZAM, practical machinists; gear cutting a specialty. Rice's Feed Water and Heater. 17 Wood street, corner First Avenue.

Painesville, O.

NORTH AMERICAN CUTLERY CO., m'fr's of Steel Shears and Scissors—best quality.

Ravenna, O.

THOMPSON, T. F., dealer in Agricultural Implements, farm machinery, hardware, seeds, fertilizers, &c. Cor. Main and Prospect sts.

BALDWIN, D. L. & SON, Contractors & Builders and manfrs of all kinds of Moulding, flooring, siding, &c. Rip, Band and Scroll Sawing.

Rheims, N. Y.

GREAT WESTERN CHAMPAGNE. Finest made in America. Equal to best imported. Has taken highest awards everywhere, and is used all over the Continent. Try a case, and you will have no other. Pleasant Valley Wine Co., Rheims, N. Y.

Rochester, N, Y.

GOWE, JNO. N., mfrs. of Specialties, such as Machine forging, bridge bolts and trusses, railroad switches, spike, mall, chisels, &c.

ELEVATORS for Hotels, Factories and Private Houses. J. S. GRAHAM & CO.

WOOD-WORKING MACHINERY. Send for Catalogue. J. S. GRAHAM & CO.

RAZOR STROPS. Sole mfrs. of all kinds of Razor Strops. Ulscht, Linn & Co. 131 N. Water

Business Directory.

Rochester, Pa,

OLIVE STOVE WORKS, (limited) manufacturers of Stoves and Hollow Ware.

Steubenville, O.

DORRANCE, D. W., Tool Works, manufacturer of hand-made miners' and stone-cutters' Tools. Promp attention given to mail orders.

Sandusky, O.

SANDUSKY WHEEL CO. manfrs. of Sarven Patent Wheels, Carriage Bodies and Seats, Plain Wood Hub Wheels, Banded Hub Wheels, Jacobs' Patent Neck Yokes.

Sandy Lake, Pa.

EBERMANN, W. S. & SONS, manfrs. of the celebrated Ebermann Boiler Feeder. Send for Circulars and Price List.

Titusville, Pa.

FOSTER & MCKAY, dealers in boilers and engines, tubing, casing, old iron, rope, and all kinds of metals. Washington street, nr. Railroad.

Toledo, O.

BAKER, HERBERT, Machine Shop and Iron Foundry. 98 and 100 Erie street.

TOLEDO FOUNDRY AND MACHINE CO. builders of Steam Engines, Circular Saw Mills and all kinds machinery. Water St., cor. Cherry

RUSSELL IRON WORKS, mnfrs. of Architectural Iron Work, castings, pulleys, shafting and steam bending machinery. Cor. Water and Lagrange streets.

STANDARD SAW WORKS, H. Bartley, manufacturer and dealer in Saws of every description. All kinds of Springs made from Sheet Steel. Reaper, Hay Knives Truss Springs, &c. made to order. 92 St. Clair Street.

UNION Wooden Ware Manufacturing Co. manufacture Sewing machines, washboards, children's wagons, carts, wheelbarrows, sleds, kitchen wooden ware, &c.

HEPBURN BROTHERS, proprie. Union Boat Works. Boats of all kinds made to order, For sale or rent. Water Street foot of Cherry.

Union City, Ind.

LAMBERT, J. W. & CO., mfrs. of fork, rake, hoe and broom handles; spokes, hubs, whiffletrees, yokes, plow-rounds, &c. Correspondence solicited.

Wheeling, W. Va.

EXCELSIOR MACHINE WORKS, Redman & Co., general machinists and manufacturers of Marine and Stationary Engines, Hangers, Pulties, Shafting, &c. Cor. 18th & Chapline streets.

Youngstown, O.

BELL, EDWIN & SON, manuf. of Nail Kegs, Pat. coiled hoops, slack barrel and keg heading and oil barrel stock.

DINGLEDY, G. H. dealer in rough and dressed Lumber, Shingles and Lath.

MORTON HOUSE, formerly Maitland House, James Morton, Prop.

TOD HOUSE, cor. Diamond and Market streets, Henkel & Bowman, Props.

Zanesville, O.

KIRK HOUSE, William Kirk, proprietor. $1.50 per day.

Brattleboro', Vt,

A JOY FOREVER!

ESTEY ORGANS

Manufactured by

J. ESTEY & CO.,

Brattleboro', Vt.

(Catalogue free on application.)

CLEVELAND NON-CONDUCTING CO.

MANUFACTURERS & DEALERS IN ASBESTOS, HAIR FELT, CEMENT, & OTHER

Pipe Coverings,

19 SOUTH WATER STREET, CLEVELAND, OHIO.

F. I. FREEMAN, Prop. JAS. GILLETT, Supt.

Ætna Machine Works.

Manufacturer of

Steam Engines,

Geared and Direct Attachment Circular Saw Mills, Steam Pumps,

IRON AND BRASS CASTINGS,

And Machinery of all description.

Prompt Attention given to Repair Work.

Also dealer in Gas and Pipe Fittings, Globe Valves, and

Second-hand Machinery of all kinds.

☞ Parties wishing to buy or sell second-hand Machinery will do well to call.

Corner Vernon and Hudson Streets, opposite the N. Y. P. & O Freight Depot, WARREN OHIO.

TRAVELERS' REGISTER.

Lake Shore & Michigan Southern.

Trains marked with a * are the only trains that arrive and depart in this city on Sundays.

ARRIVALS.	a.m.	a.m.	p.m.	p.m.
Through from East	*2 50	*6 35	1 25	*1 40
Through from East				*7 05
N. Y. & Chicago Ex		12 23		
Conneaut Accommoda'n	8 40			
Nottingham Accom'd'n	10 05		14 45	
Elyria Accommodation	8 50			
From West via Sandusky	*7 05	11 00		10 12
Fast Express	*1 35			
From West via Norwalk		11 00	2 25	10 10
Pt. Clinton Accom'dat'n		11 00		

DEPARTURES.	a.m.	a.m.	p.m.	p.m.
Through Eastern Train	*7 30	11 15	*2 55	10 35
Fast N. Y. Express	*1 50			
Conneaut Accommod'n			4 50	
Nottingham Accom'd'n	10 00		12 15	
Elyria Accommodation			5 00	
West via Norwalk	6 40		3 30	*7 35
West via Sandusky	8 05	7 00	*2 05	5 00
N. Y. & Chicago Ex		12 33		
Pt. Clinton Accom'dat'n			5 00	

Cleveland, Columbus, Cincinnati & Indianapolis.

ARRIVALS.

No. 2 Col. & Cin. & Ind'pols Ex. ..... *7 10 A.M
No. 8 C. T.V. & W. & Clev. Accom 10 30
No. 12 St. Louis & New York Exp. ..... *3 00 P.M
No 6 Indianapolis & Columbus Exp 10 20
No. 10 Wheeling & Cleveland Exp. 7 15
No. 4 Special Cin. & New York Exp *3 40

DEPARTURES.

No. 1 Cincinnati & Columbus Exp. ..... 8 00 A.M
No. 11 Cleve, Indianap. & Wheel'g Ex. .. 7 10
No. 3 Special St. Louis & Cincinnati Ex. . 1 55 P.M
No. 5 Night Express, ... *7 25
No. 7 C.T.V. & W. & Col. Accom 4 00

†This train runs daily to Indianapolis and St. Louis, and daily, except Sunday, to Cincinnati.

Cleveland, Tuscarawas Valley & Wheeling.

ARRIVALS.

Wheeling & Cleveland Express ..... 8 25 P.M
Uhrichsville Express ..... 10 30 A.M

DEPARTURES.

Wheeling & Cleveland Express ..... 7 15 A.M
Uhrichsville Express ..... 4 00 P.M

New York, Pennsylvania & Ohio.

ARRIVALS.

No. 7 Mahoning Valley Accommo ..... 10 55 A.M
No. 3 New York Express, ... *7 00 P.M
No. 1 New York Express, ... 6 50 A.M
No. 3 Pittsburgh Express, ... *7 00 P.M
No. 5 Pittsburgh Express, ... 2 00
New York Express 2 00
No. 9 Youngstown and Pitts. Local 10 15

DEPARTURES.

No. 12 New York Express, ... *7 10 A.M
No. 4 Youngstown Local, ... 11 00
No. 8 Mahoning Accommodation, ... 4 25 P.M
No. 2 New York Express, ... 10 45
No. 12 Pittsburgh Express, ... *7 10 A.M
No. 6 Pittsburgh & Main Line Express .. 2 30 P.M

Cleveland & Pittsburgh.

	ARRIVE.	DEPART
Pittsburg & Wheeling	1 45 P.M	8 50 A.M
Express	6 55	2 30 P.M
Alliance Accommodation	10 15 A.M	3 45
Ravenna Accommodation	8 35	5 35
Night Express	6 30 A.M	†11 40 P.M

† Night Express runs daily, except Saturday, by way of Wellsville, and on Saturday by way of Alliance.

Valley Railway.

ARRIVE.	DEPARTUPES.
No. 2 Accom... 10 15 A.M	No. 1 Mail ... 8 15 A.M
No. 6 Express... 1 35 P.M	No. 3 Accom. 2 30 P.M
No. 4 Mail ..... 6 30 P.M	No. 5 Exp..... 6 05

Special trains leave on Sunday at 8.30 A. M. and 4.30 P. M., arriving at Cleveland at 10 A. M. and 6.25 P. M.

Trains leave from Depot foot of South Water Street.

Connotton Valley Railway.

Arrive.	Depart.
No. 1 ..... 10 05 A.M	No. 4 ..... 10 05 A.M
No. 3. ..... 4 00 P.M	No. 2 ..... 4 40 P.M

All trains arrive and leave depot corner Commercial and Fifth Streets

Cleveland, Akron & Columbus Railroad,

Cleveland, Akron & Columbus Railroad, running over Cleveland & Pittsburgh Railroad to Hudson, for Akron, Columbus, etc.

	ARRIVE	DEPART.
Mail	1 15 P.M	8 00 A.M
Express	7 25	1 50 P.M
Accommodation	10 10 A.M	3 45 P.M

CLEVELAND & PITTSBURGH

RAILROAD.

Trains leave Cleveland and arrive at the points named below as follows: Night Express runs daily, all other trains dail except Sundays.

	Mail.	Fast Line.	Accom.	Night Expr'ss.
Leave Cleveland	8 50 am	2 30 pm	3 45 pm	11 40 pm
Arrive Hudson	10 00	3 28	4 50	12 50 am
Ravenna	10 40	3 58	5 50	1 18
Alliance	11 25	4 25	6 05 pm	2 05
N. Philadel	11 35 pm	7 15	.....	10 55
Salem	12 25	.....	.....	3 02
Canton	12 28	5 47	.....	3 20
Massillon via Alliance	12 50	6 06	.....	3 38
Akron	10 42 am	4 10	5 40 pm	.....
Pittsburgh	3 30 pm	7 45	.....	6 55
Wheeling	5 10	8 00	.....	8 55
Marietta	8 45	.....	.....	.....
Harrisburg	.....	4 15 am	.....	4 00 pm
Philadelphia	.....	7 50	.....	7 35
New York	.....	11 15	.....	10 35
Baltimore	.....	7 55	.....	7 20
Washington	.....	9 17	.....	8 47
Boston,	.....	8 00 pm	.....	.....

Ravenna Accommodation leaves Cleveland at 5:30 p m, reaching Ravenna at 7:15 p m; Akron 7:23 p m.

Newburgh Accommodations leave Cleveland at 11:00 a m and 12:30 pm. Returning, leave Newburgh at 11:10 am and 1:30 pm.

Passengers for New York, Philadelphia, Baltimore, Washington, and all points east of Pittsburgh make but one chang of cars, viz. at Union Depot, Pittsburgh, excepting those leaving on the Fast Line which has Pullman Sleepers from Cleveland to Philadelphia and New York.

The Fast Line leaving at 2;30 P. M. has elegant Pullman Palace Sleeping Cars through from Cleveland to New York without change. Pittsburgh Passengers who desire Parlor Car accommodations can secure seats in this car.

The Night Express has Pullman Sleeping Cars from Cleveland to Pittsburgh which can be occupied by passengers at Union Depot, Cleveland, any time after 9:00 P. M. At Pittsburgh passengers can take elegant through Parlor or Sleeping Cars for the East.

Sleeping and Parlor Car accommodations from Cleveland and Pittsburgh eastward can be secured at the Union Sleeping and Parlor Car Office Union Passenger Depot; of H. C. Marshall, Union Ticket Office, Weddell House; or of the Ticket Agent at the Euclid Avenue Station.

Through tickets can also be secured at the same points. Baggage checked through from the Union Depot or from Euclid Avenue Station,

By the 8:50 A. M. train a through car leaves daily for Akron, Gambier, Mt. Vernon, Columbus and immediate points, without change.

The 2:30 P. M. train has through car for Akron, Orrville, Columbus and immediate points, arriving in Columbus at 9:25 P. M.

By the 3:45 P. M. Accommodation train cars run through without change from Cleveland to Cuyahoga Falls, Akron and Millersburgh,

Night Express leaving Cleveland at 11:40 P. M., runs daily, and makes connection at Wellsville for Steubenville, Bridgeport, Wheeling, Bellaire and intermediate points. Every night in the week except Saturday the night express runs via Wellsville. On Saturday nights it runs via Alliance. All other trains run daily except Sunday.

Trains arrive at Cleveland.—Night Express at 6:30 P. M., having Pullman Sleeper from Pittsburgh; Ravenna Accommodation, 8:35 A. M., Alliance Accommodation, 10:15 A. M.; New York Wheeling & Washington Mail, with Pullman Sleeping Car from New York and Philadelphia, 1:45 P. M.; New York, Philadelphia & Wheeling Express, 6:55 P. M.

WM. A. BALDWIN, General Manager. **E. A. FORD,** Gen'l Pass. & Tkt. Agt. Pittsburgh, Pa.

C. L. KIMBALL, District Passenger Agent, corner Bank and St. Clair streets, Cleveland.

Cleveland to New York,

VIA THE

NEW YORK, PENNSYLVANIA AND OHIO RAILROAD.

[Formerly Atlantic & Great Western Railroad.]

For New York, Boston and the East. The shortest and quickest route to Pittsburgh, Washington, Baltimore and the Southeast

Until further notice trains will leave the new Central Depot, South Water Street and Viaduct, as follows:

7:10A.M. LIGHTNING EXPRESS, (daily,) sleeping and hotel coaches from Leavittsburg. 8:55 a.m. To New York, Albany and Boston without change. Parlor car, Cleveland to Salamanca. Arrives at Meadville 11:20 a.m., (dinner); Franklin, 12:33 p.m.; Oil City, 1:00 p.m.; Corry, 1:00 p.m.; Jamestown, (Lake Chatauqua) 1:57 p.m.; Buffalo, 6:15 p.m.; Rochester, 8:30 p.m.; Hornellsville, 6:40 p.m., (supper); Corning, 8:25 p.m.; Elmira, 8:57 p.m.; Binghampton, 10:58 p.m.; Albany, 6:00 a.m.; Boston, 2:45 p.m.; arriving at New York, 6:50 a.m.

10:45 P.M. NIGHT EXPRESS, (daily except Sunday), Sleeping Coach from Leavittsburg to New York without change. Arrives at Youngstown 1:45 a.m.; Meadville, 3:50 a.m.; Corry, 5:20 a.m.; Jamestown, 6:22 a.m.; Buffalo, 9:45 a.m.; Rochester, 1:10 p.m.; Hornellsville, 11:20 a.m.; Corning, 12:53 p.m.; Elmira, 1:21 p.m.; Binghampton, 2:50 p.m.; New York, 9:25 p.m.

2:30 P.M. PITTSBURGH EXPRESS,—daily, through without change. Parlor Car, Cleveland to Pittsburgh, arrives at Youngstown, 5:00 p.m.; Pittsburgh, 7:48 p.m.; Washington, 7:30 a.m.; Baltimore, 8:15 a.m; via Sharon and Sharpsville to Meadville 7:40 p.m; Corry, 9:10 p. m.; Lakewood, 9:50 p.m.; Jamestown, 10:00 p. m.; Salamanca, 11:10 p. m.

4:25 P.M. MAHONING ACCOMMODATION, stopping at all way stations. Arrives at Youngstown, 7:25 p.m; Sharon, 8:30 p.m; Sharpsville 8:40 p.m; connects at Leavittsburg with train No. 20 for Meadville and intermediate points, arrives at Meadville, 11:05 p.m. Pittsburgh, 10:48 p. m.

7:10 A.M. PITTSBURGH EXPRESS,—(daily) through without change. Arrives at Youngstown, 9:50 a.m.; Sharon, 10:55 a.m.; Sharpsville, 11:05 a m.; Pittsburgh, 12:45 p.m. Returning, leave Pittsburgh, 4:48 a.m., 8:33 a.m., and 1:13 p.m. and 4:20 p.m.

11:00 A.M. YOUNGSTOWN & PITTSBURGH Accommodation, stopping at all Way Stations, arriving at Youngstown 1:50 p.m.; Pittsburgh, 6:10 p.m. Trains arrive at Cleveland, 6:50 a.m., 10:55 a.m. 2:00, p.m. 7:00 p.m., and 10:15 p.m.

☞ This is the only route by which passengers can reach Corry, Elmira, Binghampton, New York City, and intermediate points WITHOUT CHANGE. No change to Boston and New England cities.

Baggage Checked Through to All Points East

☞ Through Tickets and information regarding the route can be obtained at the Union Ticket Office, corner Bank and Superior streets; at office 131 Bank street, and at new Depot of New York, Pennsylvania and Ohio Railway, South Water street and Viaduct, Cleveland.

A. E. CLARK, Gen. Pass'r. Agt., Cleveland, Ohio.
M. L. FOUTS, Pass. Agt., 131 Bank st., Cleveland.
P. D. COOPER, Gen. Man'gr. Cleveland

NOTICE.—Hereafter all Passes must be returned to the General Passenger Agent within FIVE DAYS after date of expiration; otherwise they will be discontinued,

Blue Grass Route of Ohio

TIME TABLE.

The Cleveland, Mt. Vernon and Delaware RAILROAD.

GEO. D. WALKER, RECEIVER.

SOUTH-BOUND TRAINS.

STATIONS.	Accom	Accom	Expr	Mail	Sundays only
Leave.	P. M.	P. M.	P. M.	A.M.	P.M.
Cleveland	5.30	3.45	2.30	8.50	.....
Hudson	6 53	5.02	3.35	10.10	4 20
Cuyahoga Falls	7.11	5.30	3.53	10.29	4 40
Akron	7.23	5.46	4.10	10.42	5 00
*North Portage	P.M.	6.00	4 24	10.54*	6 14
Clinton	.....	6 19	4.44	11.09	5 31
Warwick	.....	6.29	4.49	11.14	5 37
*Marshallville	.....	6.43	5.02	11.27*	5 50
Orrville	.....	6 58	5.14	11.42	6 03
*Apple Creek	.....	7.17	5.32	11.58*	6 22
Fredricksburg	.....	7.32	5.45	12.11	6 37
*Holmesville	.....	7.43	5.55	12.21*	6 48
Millersburg	Accom	7.55	6.08	12.34	7 00
	A. M.	P.M.			A.M.
Millersburg	5.50	.....	6.08	12.34	7 00
*Killbuck	6.02	.....	6.20	12.47*	7 12
*Black Creek	6.13	.....	6.31	12.59*	7 25
Gann	6.33 b 6.53	.....	6.51 7.11 s	1.19	7 47
Danville	7.04	.....	7.20	1.29	7 59
Howard	7.18	.....	7.29	1.38	8 10
Gambier	7.22	.....	7.38	1.47	8 20
Mt. Vernon	7.35	.....	7.51	2.00	8 33
*Bangs	7.45	.....	8.01	2.11*	8 45
*Mt. Liberty	7.53	.....	8.09	2.20*	8 54
Centerburg	8.05	.....	8.18	2.30	9 05
*Condit	8.19	.....	8.32	2.44*	9 19
*Sunbury	8.27	.....	8.40	2.53*	9 28
*Galena	8.32	.....	8.45	2.58*	9 34
Westerville	8.48	.....	9.00	3 15	9 50
Arrive at Columbus	9.15	.....	9.25	3.40	10 20
	A.M.		P M.	P.M.	A.M

NORTH-BOUND TRAINS.

STATIONS.	Expr	Mail	Accom	Accom	Sundays only
Arrive at	P M.	P.M.	A. M.	A. M.	A.M.
Cleveland	1 45	6.55	10.15	8.30	.....
Hudson	12.35	5.48	8.53	7.15	10.30
*Cuyahoga Falls	12.16	5.30	8.38	6.58	10.11
Akron	12.03	5.17	8.20	6.45	9.50
*North Portage	11.46	5.00*	8.03	A. M.	9.34
Clinton	11.30	4.44	7.46	.....	9.18
Warwick	11.25	4 37	7.37	.....	9.12
*Marshallville	11.10	4.27*	7.23	.....	9.00
Orrville	10.57	4.14	7.10 b 6.40	.....	8.47
*Apple Creek	10.40	3.56*	6.22	.....	8.27
Fredricksburg	10.26	3.43	6.08	.....	8.13
*Holmesville	10 16	3.33*	5.58	.....	8.02
Millersburg	10.05	3.22	5.45	Accom	7.50
			A. M.	P. M.	P M.
Millersburg	10 05	3.22	.....	8.35	7.25
*Killbuck	9.51	3.08*	.....	8.23	7.13
*Black Creek	9.39	2.57*	.....	8.11	7.00
Gann	9.17	2.36	.....	7.49	6 38
Danville	9.07	2.27	.....	7.39	6.25
Howard	8.58	2.18	.....	7.29	6.14
Gambier	8.49	2.09	.....	7.14	6 03
Mt. Vernon	8.37	1.57	.....	7.02	5.51
*Bangs	8.22	1.40*	.....	6.46*	5.37
*Mt. Liberty	8.14	1.31*	.....	6.37	5.28
Centerburg	8.05	1.22	.....	6.28	5.17
*Condit	7.51	1.09*	.....	6.14	5.03
*Sunbury	7.42	1.01*	.....	6.06	4.53
*Galena	7.37	12 56*	.....	6.00	4 47
Westerville	7.20	12 40	.....	5.43	4 30
Leave Columbus	6.55	12.15	.....	5.15	4.00
	A. M	P.M		P. M.	P.M.

* Stop on signal. B Breakfast. S Supper.

Special Round trip rates will be made for Sunday trains.

The Blue Grass Route of Ohio (Mt. Vernon line) will abandon their regular Sunday trains after September 10th, 1882

N. MONSARRAT, Gen'l Supt. Akron, O
E. T. AFFLECK, General Passenger Ag't, Columbus, O.

TAKE THE

BEE LINE ROUTE

POPULAR THOROUGHFARE

BETWEEN THE

EAST AND WEST.

No Midnight Changes!
No Emigrant Trains!
Connections in Union Depots for all Points.

☞ The unequalled facilities offered by this Company for luxurious travel are

Elegant, easy riding, Day Coaches,

Elegant Wagner and Woodruff Drawing Room and Sleeping Cars.

Elegant Horton Reclining Chair Cars, between Lake Erie (Cleveland,) **and the Mississippi River,** (St. Louis) **FREE.**

Model Hotel cars attached to Express Trains, which together with a track and road bed of known excellence, you are assured Comfort and Safety with

FAST TIME!

☞ Bear in mind that our through car routes are numerous and excellent, a great convenience to all travelers.

Consult your best interests by asking for and securing a Ticket via the Bee Line. For Maps, Time Tables, and other information, call on

E. B. Thomas, Gen'l Manager. **O. B. Skinner,** Traffic Manager.
A. J. SMITH, Gen'l Pass. Ag't.

LOVEGROVE and CO.,

Manufacturers of

BOILERS & ENGINES

All Sizes,

152 N. 3rd st., Philadelphia, Pa.

Write or Price List.

JUDSON'S PATENTED

SECTIONAL

Assay Furnaces

AND APPLIANCES.

Model Furnace for 1881,

All steel, light and durable, with Revolving Grate, etc. Also

Judson's Practical Stoking Attachment

Guaranteed to feed coal, coke or charcoal without choking the draft.

Manufactured only by the patentee,

W. E. JUDSON,
Cleveland, O

EDWARDS, TOWNSEND & CO.

WHOLESALE GROCERS,

And dealers in

Wines, Liquors and Cigars,

Teas a Specialty.

Nos. 151 & 153 WATER STREET

CLEVELAND O

MACHINERY FOR

Straightening and Cutting Wire

Of all Sizes to any Length.

Send for Catalogue.

JOHN ADT,

New Haven, Conn., U. S. A.

GEO. C. TRACY & CO.

Patent Law

AND SOLICITING OF PATENTS.

Blackstone Building,
CLEVELAND, O.
816 F Street, Washington, D. C.
Send for 140 page instruction book.

F. H. C. MEY,

Builder of

Dryers for Grain, &c.

Manufacturer of

Elevator Bucket & Chain Belting

For elevating, conveying and driving purposes.

From 64 to 68 Columbia Street,
BUFFALO, N. Y.

Established 1866.

ALBERT BICHLMYER,
NEW YORK

Steam Dyeing & Cleaning

ESTABLISHMENT.

Gentlemen' Clothes Cleaned, Dyed and Repaired, a Specialty.
Offices, 119 Seneca Street,
Works, 31 Champlain Street,
CLEVELAND, O.

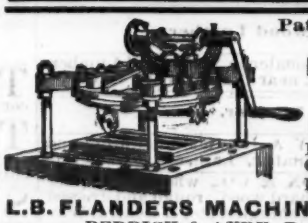
HATCH PRINTING CO.

Every description of

PRINTING

Catalogues, Letter Heads, Envelopes, &c. &c.

36 South Water Street,
CLEVELAND, OIHO.



Patent Portable Valve Seat

Rotary Planing Machine

Descriptive Circular on application.

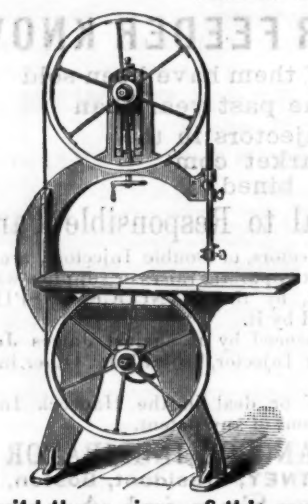
L.B. FLANDERS MACHINE WORKS
PEDRICK & AYRE, PROP'RS,
1025 Hamilton Street, Philadelphia, Pa.
New Descriptive Circular on application

FOR SALE.

One 15-H.P., mounted Threshing Machine.
One 10-H. P. Threshing Machine.
One 8-Horse Power.

Address
NATIONAL MACHINERY CO.
Cor. Bond & Superior Streets, Cleveland, O.

Eureka Band Saw.



We build three sizes of this machine
with 26, 30 and 38 inch wheels.

The two smaller sizes will saw hard wood 12 in. thick, the largest 16 in. thick. They are made of the best material and are well made.
For further information address
FRANK & CO.,
Manufacturers of
WOOD WORKING MACHINERY,
176 Terrace Street, BUFFALO, N. Y.

E. Fawcett. R. B. Fawcett.

E. FAWCETT & SON,

Proprietors of
ALLIANCE INDUSTRIAL WORKS,
Manufacturers of

STEAM ENGINES,

and Circular Saw Mills.
Specialty of Portable Saw Mills and High Speed Engines.
ALLIANCE, OHIO.

E. E. GARVIN & CO.

Manufacturers of

Milling Machines, Drill Presses
Hand Lathes, Tapping Machines, Cutter Grinders and Wood Planers. Milling Cutters, all shapes and sizes. Gear Cutting and Milling in all its branches.
No. 4 Milling Machine.

139-143 Center Street,
Cornell's Building, NEW YORK.
☞ Send for Illustrated Catalogue.

SAFETY STEAM, WATER & HAND POWER
GIVE HATCH SIZE & ELEVATION OF BUILDING, & SEND FOR ILLUSTRATED CIRCULAR.
ELEVATORS.
C. H. MITCHELL & CO.
105 MICHIGAN ST. CHICAGO.

W. R. EYNON & SONS,

Cleveland, Ohio,
MANUFACTURER OF

MACHINIST TOOLS,
DIE SINKERS,
UNIVERSAL HEADS,
UNIVERSAL VISES,
CENTERING MACHINES.
GEAR CUTTING,

MILLING MACHINES,
INDEX CENTERS,
GRINDING ATTACHMENT FOR LATHES,
& MILLING DONE.

OFFICE AND WORKS NO. 73 SCRANTON AVENUE.

Platform and Counter Scales of every description.

RIEHLE BROS.

STANDARD
SCALES
AND
TESTING MACHINES.

PHILADELPHIA, 50 South 4th st.
NEW YORK, 115 Liberty st.
ST. LOUIS, 609 North Third st.
NEW ORLEANS, 142 Gravier st.

Detroit and Cleveland

STEAM NAVIGATION CO.'S LINE OF
Palace Steamers.
STEAMERS
CITY OF DETROIT — NORTHWEST
Every week day between
CLEVELAND AND DETROIT.
Leave Detroit .... 10:30 P. M. | Leave Cleveland 9:00 P. M.
Arrive Cleveland .. 6:00 A.M. | Arrive Detroit .. 6:00 A. M.
Fare, Single Trip, $2.25 — Round Trip, $4.00, Berths Extra.

SUPERB FAST IRON STEAMER
CITY OF CLEVELAND,
SEMI WEEKLY BETWEEN
DETROIT, MACKINAW AND PT. ST. IGNACE,
touching only at Marine City, St. Clair, Port Huron, Sand Beach, Ausable, Oscoda, Alpena, and Cheboygan.
Through Fare $4.00—Meals and Berths Extra.
SEE ONLY—30 HOURS—MACKINAW TO DETROIT.

D. CARTER, General Manager.
C. D. WHITCOMB, Gen'l Pass. & Tkt. Agent.
J. F. HENDERSON, Gen'l Freight Agent.
T. F. NEWMAN, Ag't 23 River St., Cleveland, O.
General Offices, Detroit, Mich.

NIAGARA STAMPING AND TOOL CO.,

Manufacturers of

Power and Foot Presses,

Dies and Tools
For Working
SHEET METAL and WIRE

FRUIT CAN TOOLS.

SQUARING SHEARS, ETC.

Nos. 147 and 149 Elm Street,
BUFFALO, N. Y.

☞ MENTION THIS PAPER.

C. S. BARRETT, President.
P. ARNOLD, Superintendent

Dover Fire Brick Co.,

MANUFACTURERS OF
Fire Brick of all Shapes and Sizes,
— AND —
Shippers of Fine Ground Fire Clay.
Office -101½ Water Street, Cleveland.

B. F. Roberts,
BOILER MAKER,
And Sheet Iron Worker.
BRIDGE STREET, SPRINGFIELD, OHIO
Special attention paid to taking out and Piecing Portable Flues.
☞ Orders by mail to B. F. Roberts, Springfield, Ohio, promptly attended to.

CLEVELAND
ELECTROTYPE
FOUNDRY
55 FRANKFORT STREET 55
CLEVELAND, O.

I. E. MERRITT,

MANUFACTURER AND BUILDER OF
MILLING MACHINES,
KEYSEATING MACHINES,
AUTOMATIC SAWING MACHINES, SHINGLE, HEADING, STAVE AND HANDLE MACHINERY,

Veneer Cutting Machines,

For Cutting Berry Box and Picture Back Lumber from the Log.

Also, Second-Hand Machines of All Kinds.

LOCKPORT, N. Y.
Send for Catalogue.

E. G. BARTBERGER,

No. 42½ SIXTH ST.
WOOD ENGRAVER ON WOOD
→PITTSBURGH←

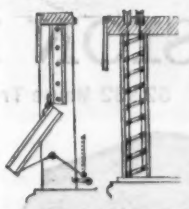
The IRWIN & REBER
PATENT
Expanding Water Conductor,
MANUFACTURED BY THE
S. S. S. Conductor Co.
LIMITED,
47 Federal St., Allegheny, Pa.

THE STANDING SEAM allows of an easy and secure fastening, keeping the pipe far enough from the wall to make any overflow from the eave pipe or head, run down the spout, and not the wall; and will open, in case of freezing, so as to prevent bursting, and still remain double-locked and water-tight.

PRINCIPAL AGENTS.

E. B. Badger & Son, Boston, Mass.; Noyes & Wines, New York; J. S. Thorn, Philadelphia; John G. Hetzell, Baltimore, Md.; R. P. Gormully, Chicago; F. Schmidt & Sons, Milwaukee; Shackelton Bros., Cleveland; Patterson & Hayes, Erie, Pa.; G. H. Peters & Son, Buffalo, N. N.; James Ackroyd, Albany, N. Y.; Witt & Brown, Cincinnati; Bull & Cozzens' Mnfg Co., St. Louis, Mo., and many others.

Patent For Sale or Divided.



The entire right, title and interest of letter patent No. 261,882, an improvement in Venitian Window blinds granted Robert Pisak July 18, 1882. This invention may be used on the inside or outside of a window. It is so constructed as to be raised and lowered by means of cords and the lower portion adapted to be outwardly inclined so as to form a protection against the suns rays and give free ventilation.
Adress, W. ENGEL, City Hall CLEVELAND, O

D. J. C. ARNOLD,

Manufacturer of

Brick Moulds, Off-bearing Trucks, Brick Wheelbarrows, &c.

All goods first class. Orders and correspondence solicited.
NEW LONDON, O.

Lehman, Richman & Co.

IMPORTERS

AND JOBBERS OF

WOOLENS

And Manufacturers of

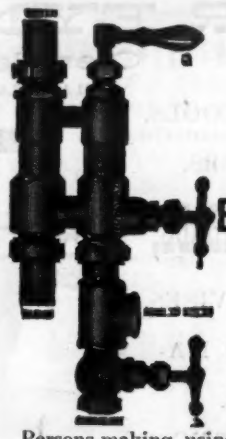
Men's, Youths', Boys' and Children's

CLOTHING!

86 & 88 WATER STREET, CLEVELAND, O.

invite the attention of close and short time buyers to the LARGEST STOCK between New York and Chicago, at prices guaranteed AS LOW as made by ANY responsible house n the United States.

THE HANCOCK INSPIRATOR



IS THE

INJECTOR PERFECTED,

IT IS THE

BEST BOILER FEEDER KNOWN,

And more of them have been sold during the past year than all Injectors in the market combined.

Thirty Days Trial to Responsible Parties.

Persons making, using, or dealing in Duplex Injectors, or Double Injectors, are hereby notified that all such Injectors in which a lifting jet apparatus raises or supplies water continuously to a forcing jet apparatus, are claimed, by the HANCOCK INSPIRATOR COMPANY, to infringe one or more patents owned by it.

On the 23d of June a suit in chancery was commenced by it against James Jenks, of Detroit, Mich., for making and selling the "Duplex Injector," so-called. Other infringers will be promptly sued.

The Inspirator Company will defend all who use or deal in the Hancock Inspirator against any suits which allege it to be an infringement of any patent.

THE HANCOCK INSPIRATOR CO.
H. M. WHITNEY, President, Boston, Mass.
Fairbanks, Morse & Co., Special Agents.
CLEVELAND, OHIO.

NO MORE SOILING THE HANDS.

MICHAEL'S

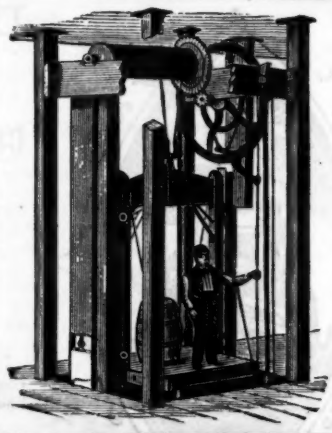
Handy Desk Pad

Combines inking cushion, of best material; cast iron japanned case, highly ornamental; ink distribution from the ink bottle direct; no overflow; no soiling fingers; perfect protection from dust; great durability. This Pad is the neatest and most satisfactory in the market. Will be sent to any address on receipt of **Price $1.50.**

Address all orders to

A. M. MICHAEL,
417 Broadway, Albany, N. Y.
Manufacturer of Steel Stamps, Steel Letters and Figures.

[Patent applied for.]
Good Arents Wanted to sell Handy Desk Pad.



The Middlebrook Elevator Manuf'g Co.

BUILDERS EXCLUSIVELY OF

Elevators & Hoisting Machinery,

Hydraulic,

Steam and Hand Power, for Passenger and Freight.

Manufacturers' Agents for the
OTTO SILENT GAS ENGINE,
From 1 to 25 horse power.

ALSO THE RIDER HOT AIR PUMPING ENGINE,

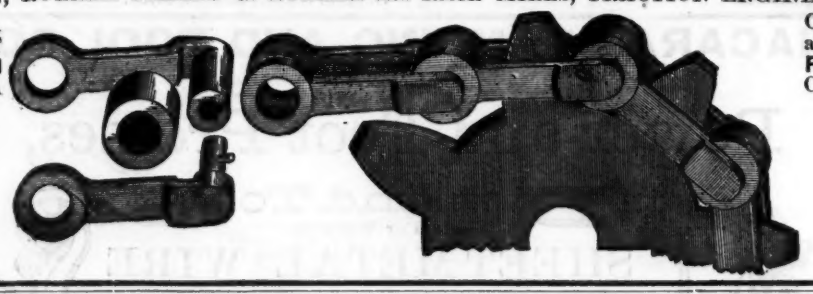
And Clark's Noiseless Rubber Wheels.

All kinds of Trucks made to order.

Factory, 175 West Larned-st.,—Office, 64 Griswold-st.
DETROIT, MICH.

THE LECHNER ANTI-FRICTION ROLLER AND DETACHABLE CHAIN.

CHAIN BELTING FOR TRANSMITTING POWER. The only medium made that will transmit so nearly ALL the power applied. No slipping nor lost motion. Especially adapted for driving HEAVY SHAFTING, ROLLER TRAINS in ROLLER and RAIL MILLS, TRACTION ENGINES, AGRICULTURAL MACHINERY, ELEVATORS, DRAGS, HOISTS, DREDGING MACHINES, LIFTING CRANES, ELEVATING NUT, SLACK and PEA COAL, SAWDUST and TAN BARK CARRIERS, &c., &c., &c., manufactured and sold by the **LECHNER MANUFACTURING CO., Columbus, O.** Also manufacturers of the LECHNER COAL MINING MACHINES, and power ROTARY COAL DRILLS For further information send for circular



Truck Hubs.

Black Birch Carriage, Wagon and

TRUCK HUBS.

Sizes from 3½x6½ to 18x22.

R. M. WHITNEY,
OLEAN, Cattaragus Co., N. Y.

Cleveland Foundry.

CASTINGS

For Machinery and Rolling Mills.

Car Wheels

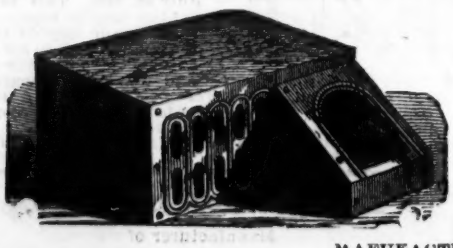
all sizes and kinds, with and without Axles.

Chilled Faced R. R. Frogs.
STREET RAILROAD TURNOUT
Nos. 9, 11, and 13 Winter Street.

BOWLER & CO.

DELUSION MOUSE TRAP.

52,932 Mouse Traps Sold in October, 1881.



THIS IS THE ONLY

SELF-SETTING TRAP

ON THE MARKET.

"The mouse goes in to get the bait
And shuts the door by his own weight,
And then he jumps right through a hole
And thinks he's out; but bless his soul
He's in a cage, some how or other,
And sets the trap to catch another."

MAFUFACTURED BY

CLAUDIUS JONES & COMPANY,

Erie, Penn'a.

Direct all Orders,
CLAUDIUS JONES & CO.

Glazed Windows.

CLEVELAND WINDOW GLASS CO.

For Doors, Sash, Blinds and Windows,

American, French & Plate Glass

73 Michigan Street and 132 Champlain Street, Cleveland, Ohio.

IRON ROOFING.

MOSER & THOMPSON,

MANUFACTURERS

Corrugated Iron Siding for Grain Elevators a Specialty.

Iron Ore Paints.

29, 31 & 33 River Street,
CLEVELAND, OHIO.

Send for Circular and Price List, mentioning th is paper.

SIDING.

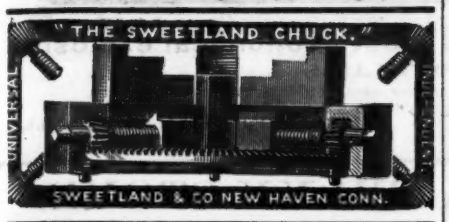
T. NEW'S PREPARED ROOFING

For steep or flat roofs. Applied by ordinary workmen at one-third the cost of tin. Circulars and samples free.

T. NEW, 32 John St., New York.

Barrett, Arnold & Kimball,

Western Agents, Chicago, Ill.



Smith & Curtiss,

JOBBERS OF

TEAS,

COFFEES AND SPICES

ALSO PROPRIETORS OF THE CLEVELAND

Coffee and Spice Mills,

107 & 109 Bank Street,

Cleveland, O.

H. C. CHANDLER

Engraver on Wood

Cor. Circle & Market Sts.

JOURNAL BUILDING INDIANAPOLIS, IND.

H. King & Son,

CORRY, PA.,

Founders and Machinists,

Manufacturers of

The King

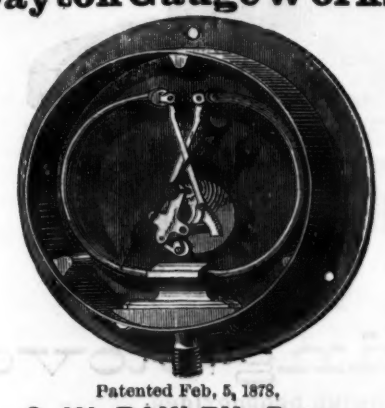
Pat. Portable Boiler & Engine

The only Portable Safety Boiler made.

Unequaled for Economy of Fuel and Repairs.

Also, General Jobbing & Repairs.

Dayton Gauge Works



Patented Feb, 5, 1878,

O. W. BAYLEY Prop.

Manufacturer of the

Bourdon and Ashcroft Gauge,

ALSO, BAYLEY'S

IMPROVED DUPLEX GAUGE,

Specially adapted for Locomotives.

32 North Jefferson Street,

DAYTON, OHIO.

All kinds of Gauges repaired at short notice.

THE BRICK AND TILE BEST MACHINES

J. W. PENFIELD

WILLOUGHBY O

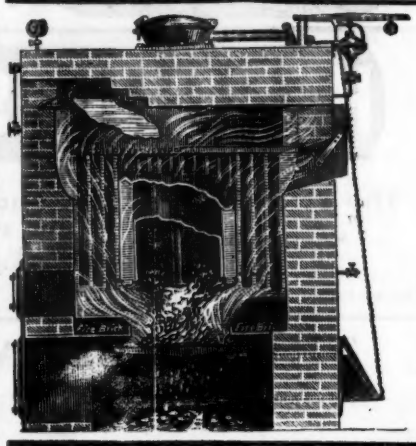
Akron Polishing and Plating Works.

ALL CLASSES OF NICKEL AND SILVER PLATING.

Stove Polishing and Machine Finishing a Specialty.

We employ improved methods of our own in treating this class of work.
A large variety of Door Plates of our own patterns. Also manufacturers of Solid Leather Wheels for Polishers. Write for Prices and Samples.

☞ Office and Works cor. Broadway and Church streets, Akron, O.



J. C. McNEIL.

PROPRIETOR OF

Akron Boiler Works,

Manufacturer of

BOILERS OF ALL KINDS.

Also Heavy Sheet and Boiler Iron Work.

SPECIALTIES:

Rotary Globe Bleach Boilers, and McNeil's Patent Magazine Heating Boilers.

Repairing Promptly Attended To

Shop 503, South Broadway, Opposite Buckeye Works.

AKRON, O.

Practical Steam and Gas Fitters.

Estimates and Specifications furnished free by

Chafer & Becker,

Practical Steam & Gas Fitters,

Particular attention given to

Railing Work, Dry Kilns, Steamboats, Rolling Mills, and every class of Pipe Fitting.

LARGE PIPE CUT TO ORDER.

LOW PRESSURE A SPECIALTY.

No. 8 Champlain Street, Cleveland, Ohio.
All orders promptly attended to. Telephone No. 1088.

NATIONAL MACHINERY COMP'NY

GREAT SALE OF IRON AND

WOODWORKING MACHINERY.

The National Machinery Co., of Cleveland, O., having decided to move their manufactory to Tiffin, O., will remove from their present premises, corner of Bond and Rockwell streets, and in consequence desire to dispose of

The Largest Stock of New and Second-hand Machinery

for wood and iron in the markets. We enumerate some of the principal Tools:

List of Wood Tools:

One second-hand Frank two-spindle Shaper, $85
One " " wood frame 2-spindle Shaper, $85
One " " " " Cutting-off Saw, $30
One " " " " Spoke and Handle Lathe, $125
One " " 32-inch Greenwood Heading Planer, $125
One " " Ellis Blind Slat Tenoner.
One " " 24-inch Ball & Co., Planer and Matcher.
One " " Power Rod & Dowell machine
One " " Fay & Co. Railway Cut-off Saw.
Two " " Sandpaper Drums.
One second-hand Dimension Planer, 24 inches with feed attachment.
One " " wood frame swing Cut-off Saw and Table.
One " " Slotting Machine.
One " " Tnorn & Dehaven Drill.
Two " " Saw Tables.
One wood frame 6-inch Sticker.
Large lot second-hand Trenton Vises.
Large lot second-hand Anvils.
One Fay & Co. Agricultural Morticer, with boring attachment.
One Fay & Co. iron frame Tenoning Machine, double heads

IRON WORKING:

16-inch Crank Planer, new.
14-inch Swing Screw-cutting Lathes.
Full assortment of Bolt Cutters.
" " " " Bolt Headers.
" " " " Nut Machinery.

ENGINES.

Our 8x14, 9x12, 10x12, 10x14, and 12x16 all new.

ENGINES AND BOILERS.

Two Skinner & Wood 6 to 8 H. P. in prime order.
One 10 H. P. other maker, and several others.

Having removed our Salesroom to the large room previously occupied by the Wilson Sewing Machine Company, we are able to carry a very fine line of Wood Working Machinery and other Tools.

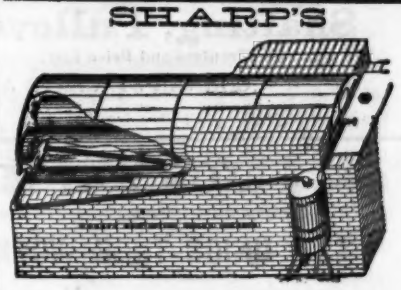
DEAN'S PATENT BONE MILL

For grinding green, raw bones without any preparation, into Bone Meal, suitable for Stock, Fowls and Fertilizer. Also for Oyster Shells, Guano, Chalk, Lime, Slate and Soapstone, Feed Corn, &c., &c.

WHEELER & CO.,

St. Johnsbury, Vt.

SHARP'S



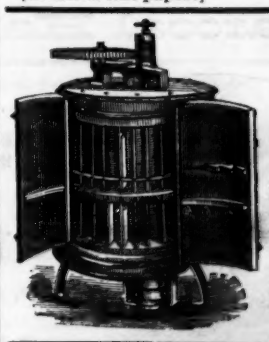
SELF-ACTING BOILER CLEANER.

Patented November 23, 1880.

THOS. SHARP & CO.

SALEM, OHIO.

☞ Send for Circular and Price List.
[Mention this paper.]



Geo. Oliver,

Manufacturer of the

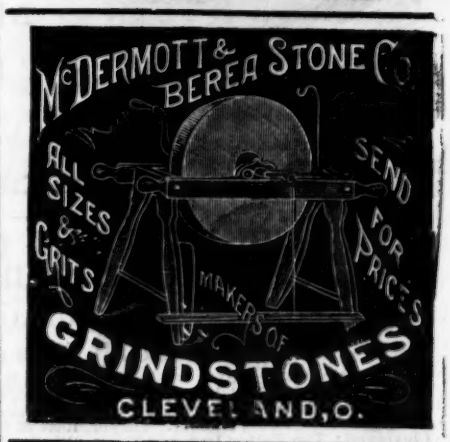
IMPROVED UNITED STATES

BRAN DUSTER,

Mill street corner Brown

Rochester, N.

Bran Duster Brushes and Wire Cloth furnished to order at Lowest Prices.



PURE PREMIUM BONE.

The tried and never failing Fertilizer in all grains and grass crops. It has proved its value as such by years of actual use all over the world. Circulars and Price List free. Address all letters pertaining to the purchase of Premium Bone, or the sale of bones, to **Excelsior Fertilizer Works** Salem Columbiana County Ohio.

EDWARD C. POST,

Successor to Smith & Post,

Manufacturer of

Hydraulic and Steam Power Passenger and Freight

ELEVATORS,

HAND ELEVATORS, Etc., Etc.

Shafting, Pullevs and Hangers, Etc.

Send for Circulars and Price List.

CORNER ST. CLAIR & WASHINGTON STREETS, TOLEDO, OHIO.

JOSEPH M. DOWNING.

UNION TUBE WORKS, NEW CASTLE, PA.

MANUFACTURER OF

LAP WELDED BOILER TUBES

FROM BEST AMERICAN

Charcoal Hammered Iron.

TRADE MARK.

THE

Elkins Manufacturing & Gas Co.'s

AJAX METAL,

FOR

LOCOMOTIVE, CAR, ROLL NECK, AND

Machinery Bearings,

PUMP RODS, VALVES AND PLUNGERS, ETC., ETC.

Furnished in Ingots or Castings.

SHEET METALS A SPECIALTY.

MANUFACTURERS OF

Babbit Metal and All Kinds of Brass and Bronze Castings.

☞ Full information can be had of Geo. B. Cushing, 224 Front st., New York; Thompson, Epping & Carpenter, Pittsburgh, Pa.; Post & Co., Cincinnati; M. M. Buck & Co., St. Louis, representing the Elkins Manufacturing & Gas Co., 617 and 619 Arch st., Philadelphia.

☞ Only Selling Agents: Thayer, Ross & Co., Boston, Mass.; Worswick Manufacturing Co. Cleveland; The Fulton Iron and Engine Works, Detroit.

THE DETROIT FREE PRESS CO.

SOLICIT ORDERS FOR

Printing, Engraving,

Stereotyping and Electrotyping.

FINE JOB AND CUT WORK A SPECIALTY.

☞ Estimates for small and large contracts freely furnished.

ADDRESS

The Free Press,

DETROIT, MICH.

Greatest Rock Breaker

ON EARTH.

CAPACITY { A TON A MINUTE. Don't Forget It!

Guaranteed to do Double the Work of any other or Money Refunded.

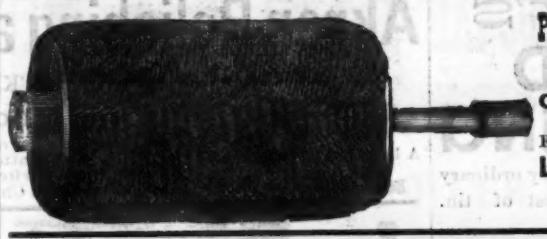
☞ Send for Circulars.

ALSO

ENGINES, BOILERS, STAMP MILLS, AND MINING MACHINERY.

GATES & SCOVILLE IRON WORKS.

52 Canal-St., Chicago.



Patent Steel Tube and Flue Brush.

Best in the Market.

Made any size required.

Combines the properties of a Scraper and Brush.

Full stock always on hand.

L. B. Flanders Machine Works

1025 Hamilton street, PHILADELPHIA, PA.

HERCULES POWDER

The strongest, safest and most economical explosive

KNOWN TO THE ARTS.

No. 1—XX for hard rock, iron and copper ores, boulders, masses of iron, etc.

No. 2—For medium hard rock, lime quarries, sand stone, stumps, etc.

J. W. WILLARD, Agent,

Office—184 Superior Street, Cleveland, Ohio.

THE CELEBRATED XX STOVE.

Manufactured Exclusively by JOHN RONEY, Hecla Foundry, Twentieth Street, 12th Ward, Pittsburgh, Pa.

New Heating Stove.

FIVE SIZES OF THE FOLLOWING PROPORTIONS:

No. 5, XX 26 inches in diameter, 40 inches high - - weight 180 lbs.
No. 6, XX 30 inches in diameter, 3½ feet high - - - weight 255 lbs.
No. 7, XX 34 inches in diameter, 4 feet high - - - weight 372 lbs.
No. 8, XX 36 inches in diameter, 4 feet, 5 inches high - weight 520 lbs.
No. 9, XX 36 inches in diameter, 4 feet 9 inches high - - weight 818 lbs.

The above stove, for durability and heating purposes, cannot be surpassed. It also saves coal, from the fact that once heated up it retains the heat for a long time without a fresh supply of fuel. It is particularly adapted for hotels, school-houses, churches, large offices, machine shops, etc.

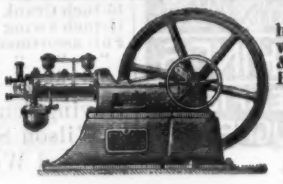
NEW OTTO SILENT GAS ENGINE.

Working without Boiler, Steam, Coal, Ashes or Attendance.

Started instantly by a Match, it gives full power immediately.

When stopped all expense ceases.

No explosions; no fires nor cinders; no gauges; no pumps; no engineer or other attendant while running.



Unsurpassed in every respect for hoisting in warehouses, printing, ventilating, running small shops, &c., 2, 4 and 7 H.P. and upwards. Built by

Schleicher, Schumm & Co.,

PHILADELPHIA.

ALBERT FISHER,

Agent for Cleveland.

48 Merwin Street, Cleveland, O.